Initial Funding Levels for the Special Accounts in the New BOJ-NET

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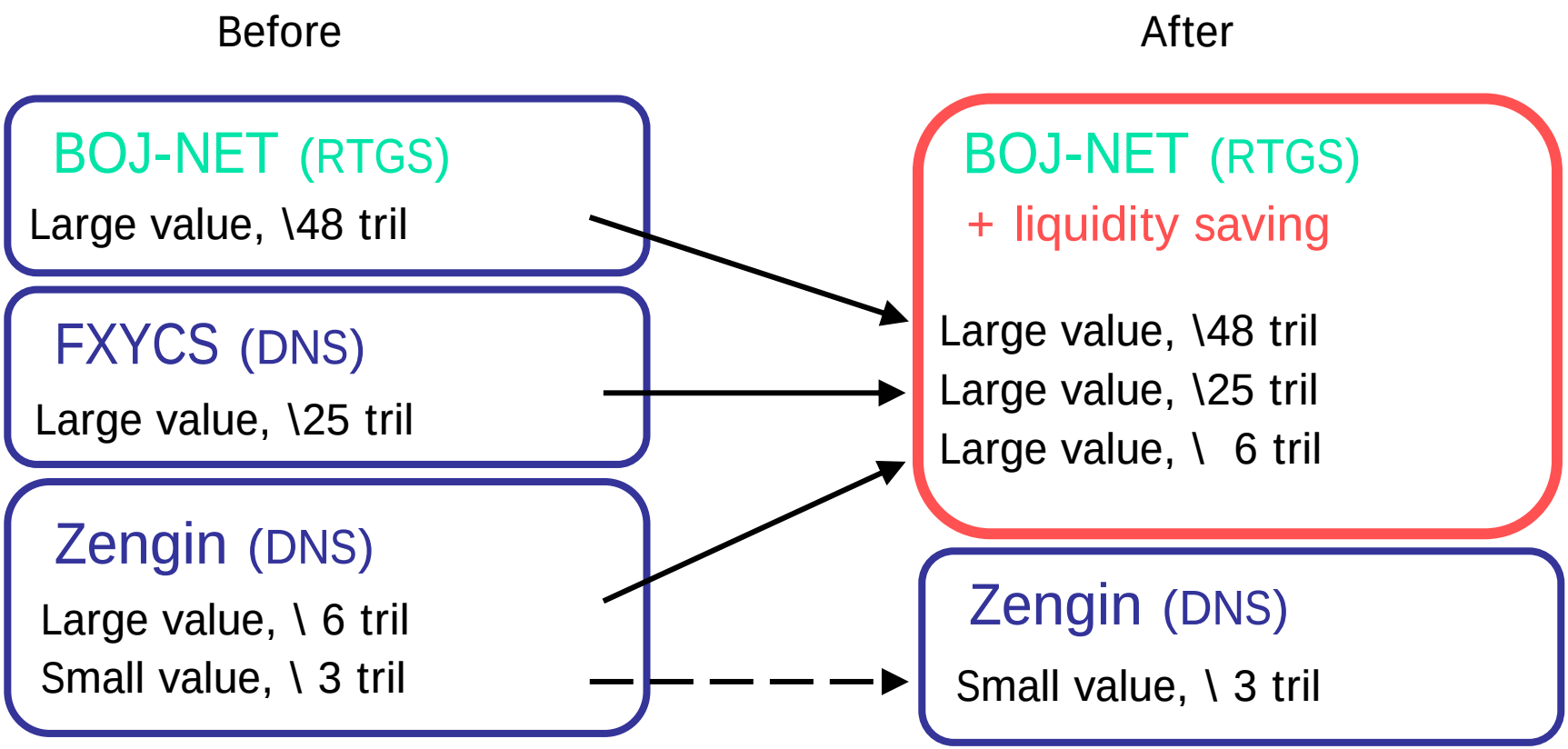
Reform Plan of LVPS in Japan

- Migrate large-value payments currently handled in two private systems (FXYCS and Zengin System) to BOJ-NET
  - Eliminating intraday settlement exposure
- Add centralized queuing and offsetting mechanisms to BOJ-NET
  - Changeover from pure RTGS to queue-augmented RTGS

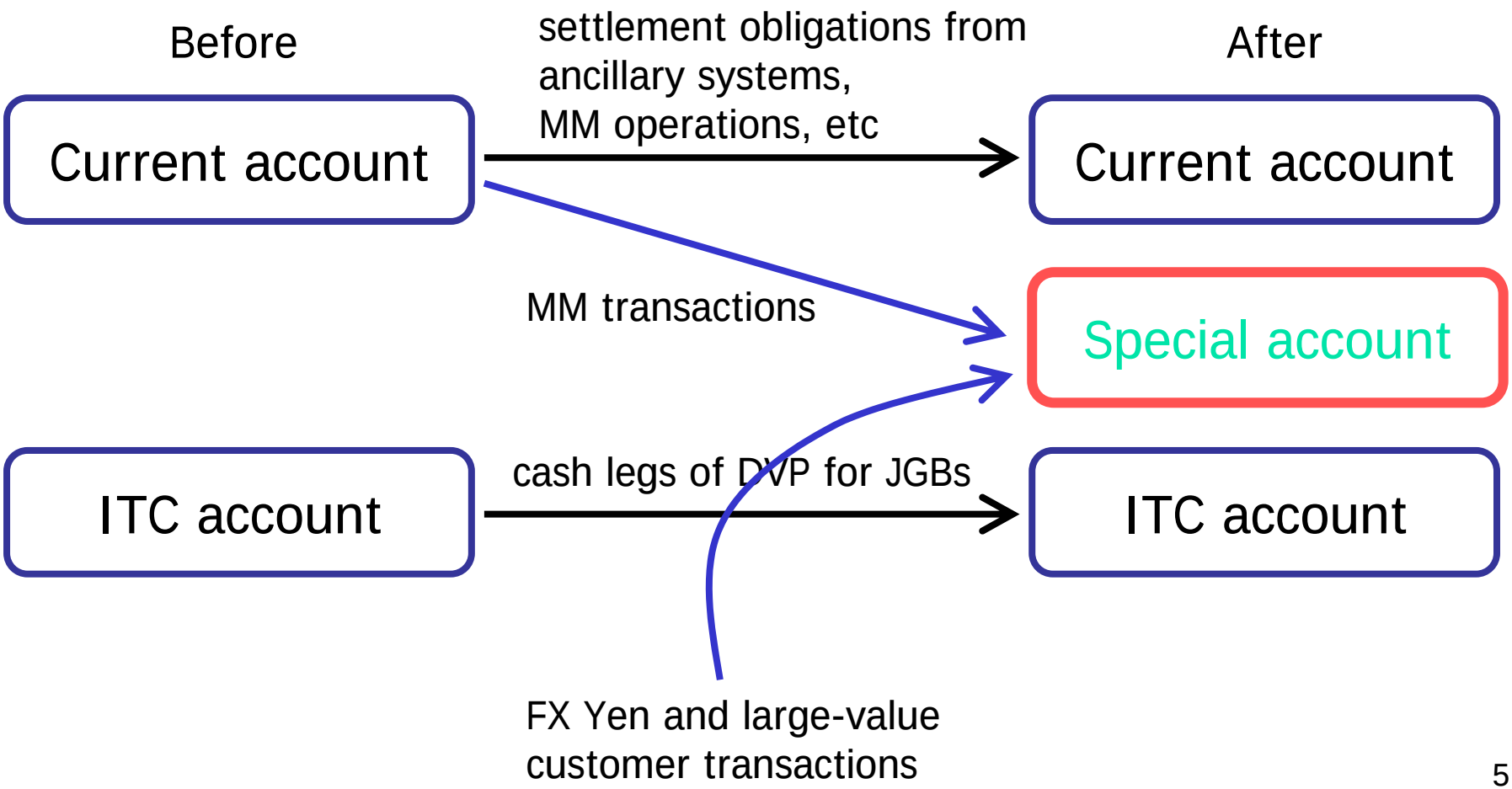
Reform Plan of LVPS in Japan (cont'd)

Future structure of LV payments



Reform Plan of LVPS in Japan (cont'd)

BOJ account structure



Reform Plan of LVPS in Japan (cont'd)

Functions on each account

- Participant banks can designate whether to settle each payment instruction via special or current A/C
  - Special A/C does not offer overdraft capability but offers queuing and offsetting mechanism
  - Collateralized overdrafts remain available on current A/C
  - A unique liquidity-saving facility, known as SPDC, continues to be available on ITC A/C

Initial Funding Levels

- New BOJ-NET will require at least some funding of special A/C
- What levels of funding will work well?

Initial Funding Levels (cont'd)

Two issues:

Will progress payments (pay-ins during the day from current to special A/C) be made?

- Our simulations only approximate progress payments
- We generally assume no progress payments

Initial Funding Levels (cont'd)

Two issues:

If there are no progress payments, then what level of funding is best?

- No clear answer, without some measure of costs and benefits of intraday funds
- We look at speed of settlement, and total amount settled by 16:00

Initial Funding Levels (cont'd)

- Once the decision on the level of funding has been made (roughly), one can search (using simulations) for a local optimum of the distribution of balances across banks
- The local optimum has the characteristic, for example, that an extra *yen* of initial balances placed in any bank's A/C will yield the same incremental increase in settlements
- We investigate different levels of funding, and the behavior of the resulting system

Simulations and Results

Four basic simulations:

- *Current baseline*: how much funding is required to settle with immediacy
- *Exact MND (multilateral net debit) funding*: simple progress-payment approximation
- *Average MND funding*
- *Half average MND funding*

Simulations and Results (cont'd)

Averages from the basic simulations

JPY billion; minutes

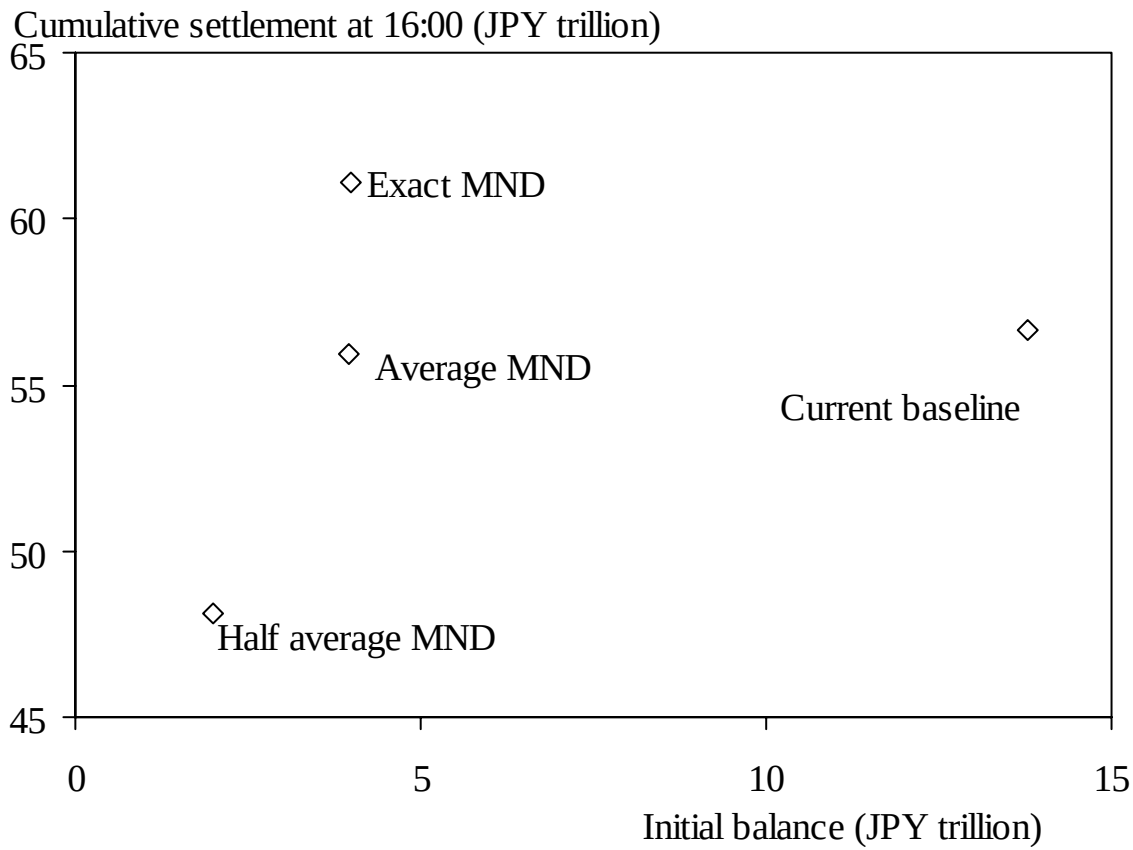
	Initial balances	Megas' initial balances	End-of-day pay-ins	Cumulative value settled at 16:00	Gross value unsettled at 16:00	Average time of settlement
Current	13,780	3,460	0	56,673	12,625	251
	(-)	(-)	(-)	(-)	(-)	(-)
Exact MND	3,975	492	0	61,106	8,192	202
	(0.288)	(0.142)	(-)	(1.078)	(0.649)	(0.806)
Average MND	3,964	492	3,224	55,954	13,344	213
	(0.288)	(0.142)	(-)	(0.987)	(1.057)	(0.851)
Half average MND	1,982	246	3,712	48,119	21,180	249
	(0.144)	(0.071)	(-)	(0.849)	(1.678)	(0.991)

Simulations and Results (cont'd)

The total value settled by 16:00 and the amount of the initial balances used

Better off

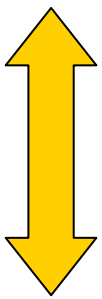
Worse off



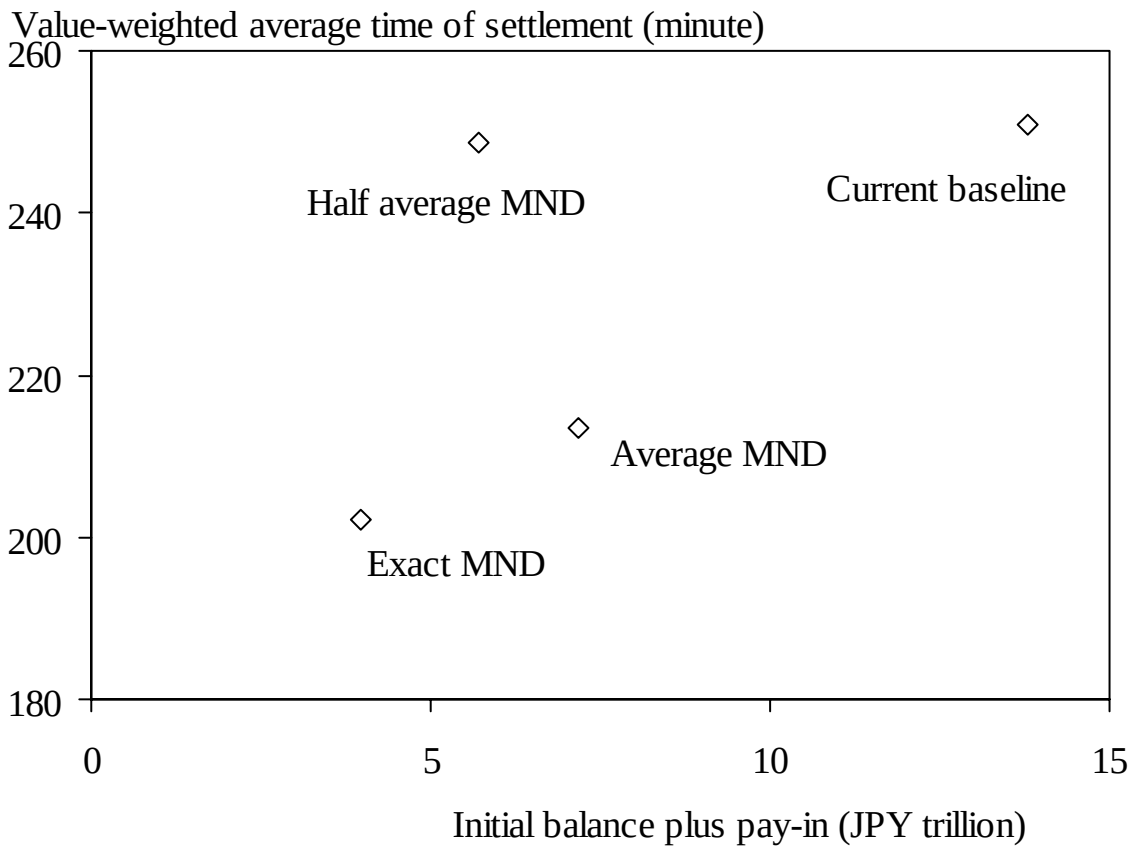
Simulations and Results (cont'd)

The value-weighted average time of settlement and the total liquidity required

Worse off

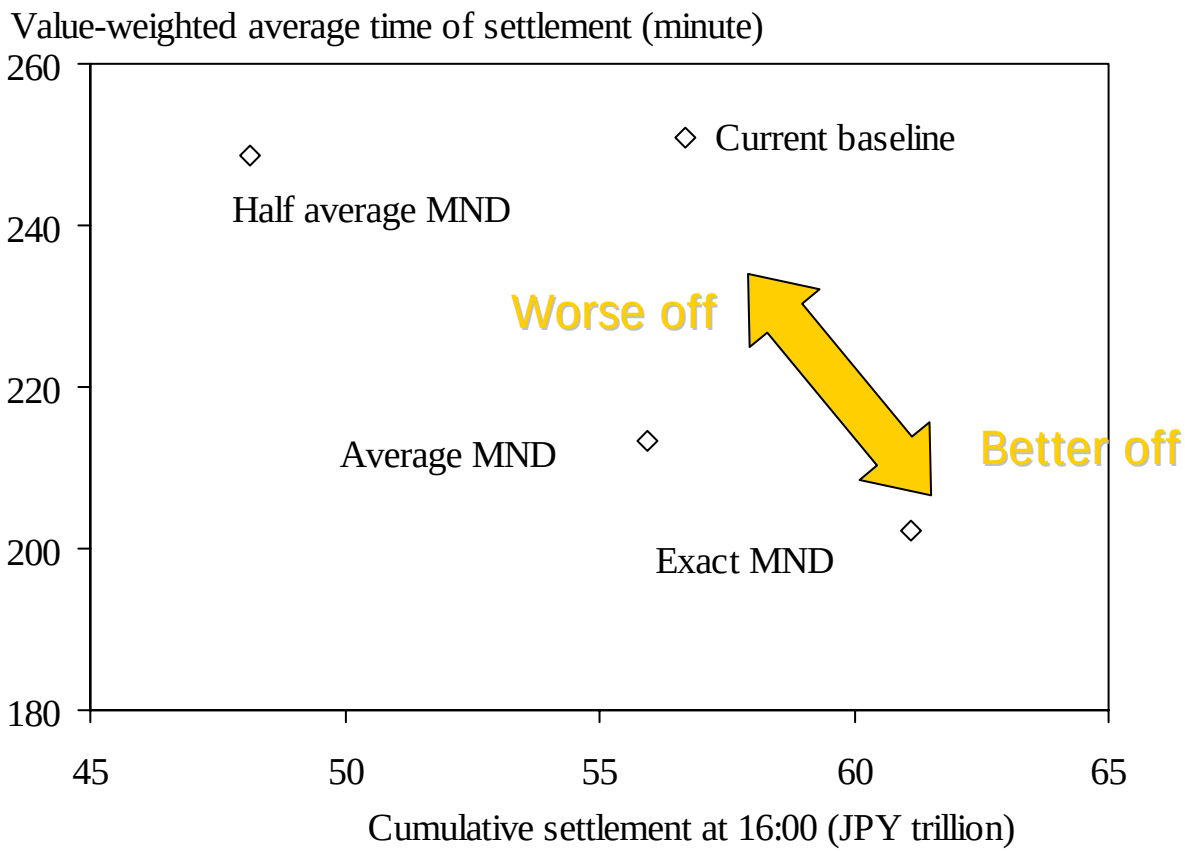


Better off



Simulations and Results (cont'd)

The value-weighted average time of settlement and the total value settled by 16:00



Simulations and Results (cont'd)

Distributional simulations

First set of simulations:

- All but the five largest banks are endowed with their exact MND, while the five largest each are endowed successively with 1, 2, and 3 times 90th percentile level

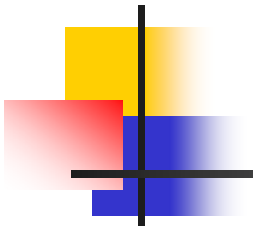
Simulations and Results (cont'd)

Distributional simulations

JPY billion; minutes

	Initial balances	Megas' initial balances	End-of-day pay-ins	Cumulative value settled at 16:00	Gross value unsettled at 16:00	Average time of settlement
Exact MND	3,975	492	0	61,106	8,192	202
	(-)	(-)	(-)	(-)	(-)	(-)
+90 percentile	3,500	18	1,527	58,170	11,129	214
	(0.881)	(0.036)	(-)	(0.952)	(1.359)	(1.060)
+90 percentile*2	3,518	35	1,452	58,495	10,803	214
	(0.885)	(0.071)	(-)	(0.957)	(1.319)	(1.061)
+90 percentile*3	3,535	53	1,405	59,025	10,274	213
	(0.889)	(0.107)	(-)	(0.966)	(1.254)	(1.053)

Simulations and Results (cont'd)



Distributional simulations

Next set of simulations:

- All but the five largest banks are endowed with the average of their exact MND, while the five largest each are endowed successively with 1, 2, and 3 times 90th percentile level

Simulations and Results (cont'd)

Distributional simulations

JPY billion; minutes

	Initial balances	Megas' initial balances	End-of-day pay-ins	Cumulative value settled at 16:00	Gross value unsettled at 16:00	Average time of settlement
Average MND	3,964	492	3,224	55,954	13,344	213
	(-)	(-)	(-)	(-)	(-)	(-)
+90 percentile	3,490	18	3,398	54,172	15,128	223
	(0.880)	(0.036)	(1.054)	(0.968)	(1.134)	(1.044)
+90 percentile*2	3,507	35	3,371	54,056	15,243	222
	(0.885)	(0.071)	(1.046)	(0.966)	(1.142)	(1.042)
+90 percentile*3	3,525	53	3,366	54,621	14,678	221
	(0.889)	(0.107)	(1.044)	(0.976)	(1.100)	(1.033)

Simulations and Results (cont'd)

Distributional simulations

Final set of simulations:

- All but the five largest banks are endowed with half their exact MND, while the five largest each are endowed successively with 1, 2, and 3 times 90th percentile level

Simulations and Results (cont'd)

Distributional simulations

JPY billion; minutes

	Initial balances	Megas' initial balances	End-of-day pay-ins	Cumulative value settled at 16:00	Gross value unsettled at 16:00	Average time of settlement
Half average MND	1,982 (-)	246 (-)	3,712 (-)	48,119 (-)	21,180 (-)	249 (-)
+90 percentile	1,754 (0.885)	18 (0.071)	3,756 (1.012)	46,017 (0.956)	23,282 (1.099)	259 (1.041)
+90 percentile*2	1,772 (0.894)	35 (0.142)	3,724 (1.003)	46,350 (0.963)	22,948 (1.083)	258 (1.037)
+90 percentile*3	1,789 (0.902)	53 (0.214)	3,720 (1.002)	46,494 (0.966)	22,804 (1.077)	257 (1.033)

Simulations and Results (cont'd)

Distributional simulations

- In general, these simulations show that there is room to optimize the level of initial funding, as a quite large reduction in funding by some banks need not negatively affect system performance

Simulations and Results (cont'd)

Progress-payment approximation simulations

- An alternative to optimizing initial balances is to focus instead on progress-payment. Starting from half average MND funding, for example, how would a intraday (at 10:00 or noon) injection of liquidity perform?

Simulations and Results (cont'd)

Progress-payment approximation simulations

JPY billion; minutes

	Initial balances	Intraday pay-ins	End-of-day pay-ins	Cumulative value settled at 16:00	Gross value unsettled at 16:00	Average time of settlement
Half average MND	1,982 (-)	0 (-)	3,712 (-)	48,119 (-)	21,180 (-)	249 (-)
+Exact MND at 10:00	1,982 (1.000)	6,095 (-)	2,780 (0.749)	61,621 (1.281)	7,678 (0.362)	171 (0.690)
+Half exact MND at 10:00	1,982 (1.000)	3,047 (-)	3,202 (0.862)	59,152 (1.229)	10,146 (0.479)	195 (0.786)
+Exact MND at 12:00	1,982 (1.000)	5,571 (-)	2,302 (0.620)	62,681 (1.303)	6,617 (0.312)	190 (0.764)
+Half exact MND at 12:00	1,982 (1.000)	2,785 (-)	3,094 (0.834)	59,076 (1.228)	10,223 (0.483)	210 (0.844)

Simulations and Results (cont'd)

Progress-payment approximation simulations

- These simulations show that the intraday pay-ins dramatically improve the performance of settlement in terms of both settlement speed and value.
- The earlier the timing of the intraday pay-ins, the greater the settlement performance improves.

Liquidity Effects of Combining FXYCS, Zengin System, and BOJ-NET payments

Liquidity complementarities:

- Will the combination of BOJ-NET, FXYCS, and large-value Zengin be liquidity-saving?
- FXYCS and LV Zengin could implement intraday finality on their own, as CHIPS has done

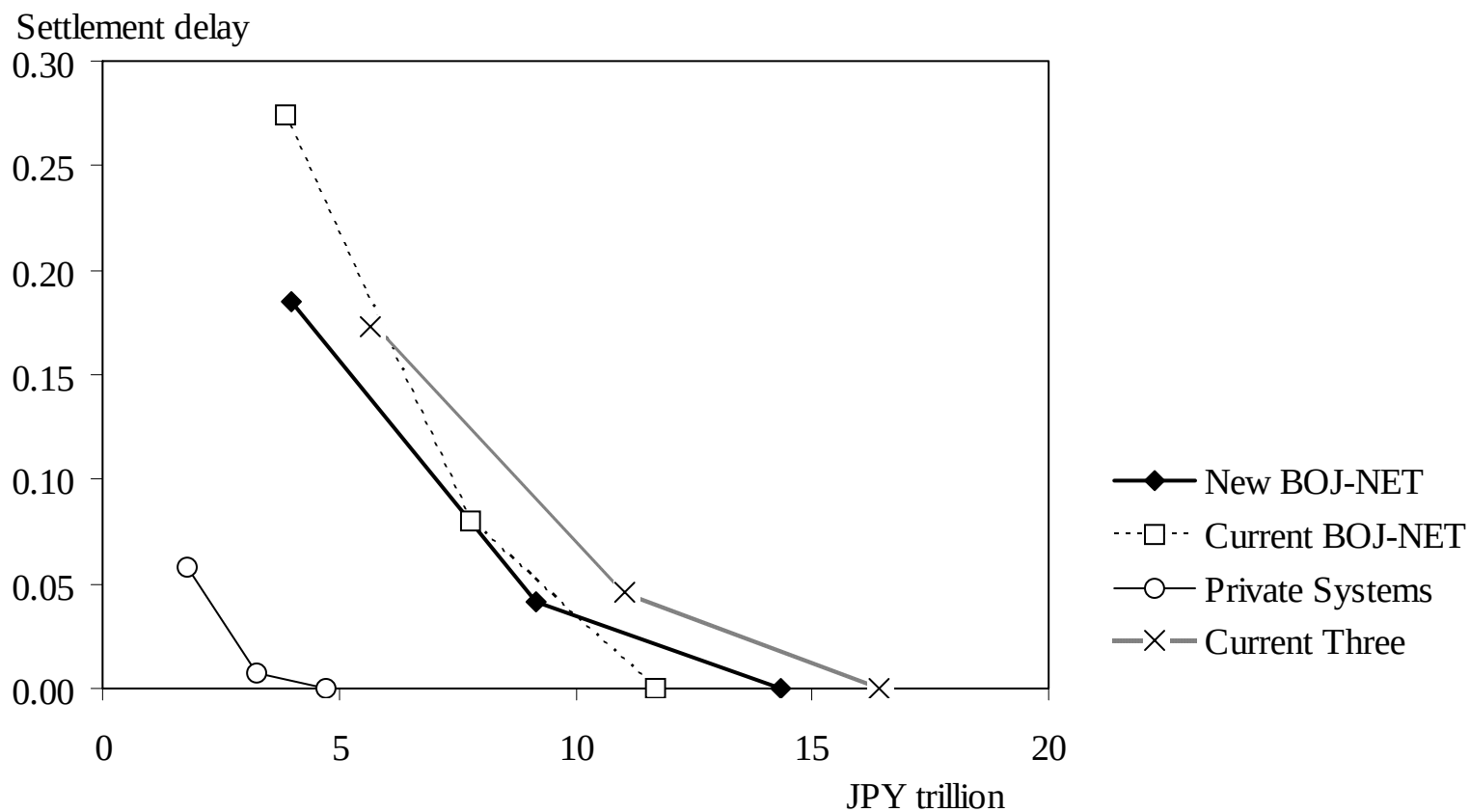
Liquidity Effects of combination (cont'd)

Which alternative saves liquidity?

- {FXYCS and LV Zengin} and {BOJ-NET} separately implement intraday finality using new BOJ-NET algorithm, or
- {New BOJ-NET}

Liquidity Effects of combination (cont'd)

Delay indicator and liquidity required



Liquidity Effects of combination (cont'd)

Delay indicator and liquidity required

JPY billion; minutes

		Level (1)	Level (2)	Level (3)
New BOJ-NET				
	Liquidity	3,975	9,159	14,344
	Delay	0.185	0.041	0.000
	Time	202	158	146
Current Three Systems				
	Liquidity	5,649	11,032	16,415
	Delay	0.173	0.042	0.000
	Time	197	159	146
	Current BOJ-NET			
	Liquidity	3,850	7,760	11,670
	Delay	0.274	0.080	0.000
	Time	236	178	154
	Private Systems			
	Liquidity	1,799	3,272	4,745
	Delay	0.058	0.007	0.000
	Time	154	138	136

Liquidity Effects of combination (cont'd)

- There are strong liquidity complementarities to combining the systems in new BOJ-NET
- Not only is it always liquidity-saving relative to the separate systems, but it is liquidity-saving, so long as there is some delay, relative to current BOJ-NET
- May reflect late arrival of settlement payments of Zengin and FXYCS

Conclusion

- It may be useful to encourage banks to establish conventions for the funding of the special A/C in new BOJ-NET, as that may promote both a smooth transition to the new system, and satisfactory settlement patterns for the participants