Results of the 2007 Operational Risk Data Collection Exercise

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1. Outline of the Exercise

(1) Background

This exercise was conducted jointly by the Financial Service Agency (FSA) and the Bank of Japan (BOJ). Participation in this exercise was voluntary. It requested information on operational risk data (internal loss data and scenario data) from 14 banks (including bank holding companies) that use or plan to use internal loss data for the calculation of operational risk capital. Note that this paper refers only to the internal loss data (it does not refer to the scenario data, partly because the number of scenarios collectively was not large enough.) The data were submitted to the FSA and BOJ through February 2007.

The exercise had several purposes, including assisting the FSA and BOJ in understanding the operational risk profiles of Japanese banks and their progress in operational risk data collection. At the same time, we believe that sharing the result of the exercise among financial institutions will assist them in enhancing their collection, analysis and evaluation of operational risk data.

This was the first operational risk data collection exercise targeting Japanese banks. Similar exercises were conducted by the Basel Committee[1], targeting financial Institutions from G10 countries including Japanese banks and by the U.S. regulators[2], targeting financial institutions with a presence in the U.S. The methodology and the format presenting the results in this paper was designed after the U.S. exercise, thus enabling comparisons almost on the same basis.

(2) Scope of the Exercise

The exercise requested the following two types of information: (a) internal loss data and (b) scenario data (See the questionnaire for the detail <appendix>). As mentioned above, this paper refers only to internal loss data.

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[1] The Quantitative Impact Study for Operational Risk: Overview of Individual Loss Data and Lessons Learned (http://www.bis.org/bcbs/qis/quisopriskresponse.pdf),
The 2002 Loss Data Collection Exercise for Operational Risk
(http://www.bis.org/bcbs/qis/ldce2002.pdf)

[2] The 2004 Operational Risk Loss Data Collection Exercise
(http://www.bos.frb.org/bankinfo/qau/papers/pd051205.pdf)

(a) Internal Loss Data

The participating banks were asked to provide detailed data on operational losses. This information included the loss amount (net / gross), the date of the loss (date of occurrence and date of discovery), associated business lines and types of occurrences. All loss data were requested with no specific loss threshold and with no standard time period.

(b) Scenario Data

The participating banks were asked to provide information on each of their major operational risk scenarios[3] the frequency, loss amount, associated business line and event type and a simple description of the scenario.

(3) Participants

Fourteen banks, including bank-holding companies, participated in this exercise. All of them provided data on individual losses of more than one yen, and some provided data on individual losses of zero yen (near misses) or losses of less than zero yen (misses that brought about an unexpected profit). Nine banks provided their scenario data.

Contacts:

FSA	Shinichiro Shimizu	81-3-3506-6188
BOJ	Tsuyoshi Ooyama	81-3-3277-3018
	Tsuyoshi Nagafuji	81-3-3277-2987

[3] We requested the banks to submit: (a) scenarios with the 10 largest loss amounts and (b) scenarios with the 10 largest loss amounts, with a frequency equal to, or more than once in every 1000 years.

2. Basis of the Aggregation and Analysis

The following steps were taken before aggregating and analyzing the data. Note that these steps were taken for comparative analysis and were not intended to show common or sound practices in handling operational loss data.

(1) Net losses were used

We used net loss amounts (the loss incurred by banks after taking into account recoveries from clients, insurance or other sources) and not gross loss amounts. This was because banks define 'net loss' more uniformly than 'gross loss.' For example, some banks treat erroneous money transfers recovered on the same day as losses, and some banks do not. In this case, different definitions yield different gross loss amounts, whereas both definitions yield the same net loss amount of zero yen.

Table 2-1 shows the difference between the numbers and amounts of the two definitions of loss amount. Most of the differences in amounts between the losses based on gross amounts and the losses based on net amounts are caused by the differences in the money transfers that were recovered on the same day. Amounts that were recovered by insurance account for only 3.5% of the difference.

(Table 2-1) Comparison Between Gross versus Net Amounts*

	Based on Gross Amounts	Based on Net Amounts
Number of All Losses, including those of 0 yen or less	156,112	
Number of Losses of 1 yen or more	146,884	134,061
Number of Losses of 1 million yen or more	6,118	4,586
Total Loss Amount (100 million yen)	2,813	1,766

* Based on all the data, not only the 'stable data' (explained in 2(5)).

(2) Net Losses greater than or equal to 1 million yen were used for most of the analysis

We only used losses that were more than zero. Some banks collect near misses and assign zero as loss amounts. Some banks collect mistakes that brought about profits and assign a negative as a loss amount.

Further, losses greater than or equal to 1 million yen were used for most of the analysis. This is in accordance with the Japanese regulation to request AMA banks to set their internal data threshold equal to or below 1 million yen. This also facilitates the comparison with the preceding exercises by the BCBS and the U.S. regulators.

See table 2-2 for the number of losses for each category above.

(Table 2-2) Number of Losses

Category	Below zero yen	Zero yen	1 yen or more	Total	1 million yen or more
Based on Net Amount	282	21,769	134,061	156,112	4,586
Based on Gross Amount	434	8,794	146,884	156,112	6,118

* Based on all the data, not only the 'stable data' (explained in 2(5)).

(3) Losses related to credit risk were included

We included losses that were related to credit risk, which Basel II requires to treat as a credit risk for the purposes of calculating minimum regulatory capital. There was no significant difference, as shown in table 2-3.

(Table 2-3) Number of Losses

	Total	Losses related to Credit Risk
Number of Losses (1 yen or more)	134,061	787 (0.6%)
Total Loss Amount (100 million yen)	1,766	94 (5.3%)

* Based on all the data, not only the 'stable data' (explained in 2(5)).

(4) Date of occurrence, not date of discovery was used

We assigned the date of occurrence as the date of each loss providing it was available. For loss data without a date of occurrence, we used the date of discovery. In the case where neither dates were available, we used what the banks provided, including the accounting date.

(5) 'Stable' losses were used

We calculated annual averages based on each bank's 'stable data,' which are losses that occurred during a time period over which loss frequency appeared relatively stable[4]. Without using their stable data, appropriate annual average of number of losses and amounts would not have been calculated as many banks submitted data collected before they put a current loss data collection system in place. Note that only 'stable data' are used in sections 3 and 4.

[4] The 'stable' loss period for each bank represents a series of contiguous half-years in which there were no extreme changes in the number of losses between the half-years (see the hypothetical example below). When the extraction of stable data was difficult, we asked the banks for more information.

A hypothetical example: Data after 03-01 were deemed 'stable' for this bank.

Fiscal Year	01-1	01-2	02-1	02-2	**03-1**	**03-2**	**04-1**	**04-2**	**05-1**	**05-2**	**06-1**
Number of Losses	2	3	4	8	**110**	**82**	**119**	**134**	**123**	**111**	**135**

3. Basic Descriptive Statistics

This section shows basic descriptive statistics from the data explained in section 2.

(1) The Number and the Total Amount of Losses by Participant

Table 3-1 shows the number and total amount of losses for each participant (based on stable data), which is classified by the number of reported losses[5].

Differences in the time period during which the 'stable data' was collected widened the differences in the number and the amounts seen in the table. Some banks began collecting data before 2001. One bank collected data for less than one year.

(Table 3-1) Number and Total Amount of Losses for Each Participant

Number of Losses of 1million yen or more	Number of Participants	Number of Losses of 1million yen or more	Number of Losses of 1 yen or more	Total Loss Amount* (in 100million yen)
0 – 24	5	42	16,357	4
25 – 249	6	334	32,276	93
250+	3	3,666	82,881	1,315
Total	14	4,042	131,514	1,412

Based on stable data.

* Based on losses equal to or greater than 1 yen.

[5] According to the number of losses based on stable data that is greater than or equal to 1 million yen, banks are classified into three sub-groups: 0-24, 25-249, 250+

(2) Losses by Year

Table 3-2 shows the number of banks that reported stable data and the number and the total amount of net stable data.

Only two banks had stable data before FY2001, whereas all the 14 participants had them for FY2006[6].

The number of losses per bank shows no particular tendency, whereas the total number of losses increases as the number of banks that collected the stable data increases. Neither the total amount of losses nor the average loss per bank shows a particular trend over time, because small numbers of large losses substantially affect the figures in a given year.

(Table 3-2) Number of Losses, Total Amount of Losses, Number of Banks Reporting

（Stable Data of 1 million yen or more）

（Fiscal Year）	Pre-2001	2001	2002	2003	2004	2005	2006
Number of Losses	—	—	361	378	473	886	1,180
Total Loss Amount (in 100 million yen)	—	—	93	82	54	620	85
Number of Banks Reporting*	2	4	4	7	8	12	14
Number of Losses per Bank	—	—	90	54	59	74	84
Total Loss Amount per Bank (in 100 million yen)	—	—	23	12	7	52	6

Based on stable data, greater than or equal to 1 million yen.

* Number of banks that reported stable data

[6] In table 3-2, banks that began collecting stable data from any quarter in a given fiscal year (from April to March in the following year) are treated the same as those banks that began collecting stable data from any other quarter (e.g. 1st, 2nd 3rd quarter, etc.). That is, all the banks that began collecting the stable data from any quarter of a given fiscal year are counted as one bank in table 3-2.

Note that we counted periods for the collection of stable data by month to calculate an annual average for other tables, including tables 3-3 and 3-4. For example, we assigned 0.67 year (8/12) for a bank that submitted 8 months of stable data for that given fiscal year. Some banks only submitted data from April to November for the last fiscal year for their data.

(3) Number of Losses by Business Line and Event Type

Table 3-3 provides the average annual number of losses by business line and event type for the stable data[7].

More than half of the losses occurred in retail banking. The business line with the second largest number of losses was commercial banking. With respect to event type, execution, delivery and process management (EDPM) and external fraud accounted for the largest number of losses per year.

(Table 3-3) Number of Losses, Annualized

	Internal Fraud	External Fraud	Employ-ment Practices & Workplace Safety	Clients, Products & Business Practices	Damage to Physical Assets	Business Disruption & System Failures	Execution, Delivery & Process Mgmt	Total	Percent of Total
Corporate Finance	0	0.1	0.1	1.0	0	0.7	2.6	4.5	0.5%
Trading & Sales	0.1	0	0.4	2.1	0	2.4	38.8	43.9	4.7%
Retail Banking	5.1	336.1	1.3	34.1	10.4	26.6	124.3	537.9	57.2%
Commercial Banking	2.7	6.0	10.9	19.0	6.5	55.2	141.6	242.0	25.7%
Payment & Settlement	0	0	0	0	0	3.6	2.2	5.8	0.6%
Agency Services	0	0	0.1	8.7	0.1	11.2	29.5	49.7	5.3%
Asset Mgmt	0	0	0.9	4.5	0	0.5	14.1	20.0	2.1%
Retail Brokerage	7.9	0	0.1	13.2	0	1.7	10.0	32.8	3.5%
Others	0.8	1.0	0.2	0	1.2	0.8	0.2	4.2	0.4%
Total	16.6	343.2	14.0	82.7	18.2	102.7	363.2	940.7	100.0%
Percent of Total	1.8%	36.5%	1.5%	8.8%	1.9%	10.9%	38.6%	100.0%	

Based on stable data, greater than or equal to 1 million yen.

[7] To obtain the results presented in Tables 3-3 and 3-4, we first annualized the loss data (stable data greater than or equal to a net amount of 1 million yen) separately for each participating bank. Specifically, we divided a bank's number of losses and the total loss amount occurring in each business line/event type category by the number of years of stable data for that bank, thus obtaining the annualized number of losses and the total loss amounts for that bank. Those annualized number of losses and annualized total loss amounts were aggregated across banks to obtain the results presented in Tables 3-3 and 3-4, and the 'frequency of large-impact losses' in (5) of this section.

(4) Total Amount of Losses by Business Line and Event Type

Table 3-4 provides the total loss amount per year across all the banks by business line and event type of Basel II[8].

Nearly half of the total loss amount was reported in Commercial Banking, followed by Trading and Sales. With respect to event type, 'Execution, Delivery and Process Management' (EDPM) and 'Clients, Products and Business Practices' (CPBP) accounted for more than three quarters of the total loss amount per year, with EDPM accounting for more than half. Note that the small number of large losses substantially affected the loss amount figures, thus the appearance of this table could have changed depending on where in the table the large losses occurred.

(Table 3-4) Total Loss Amount (100 million yen), Annualized by Business Line and Event Type

	Internal Fraud	External Fraud	Employment Practices & Workplace Safety	Clients, Products & Business Practices	Damage to Physical Assets	Business Disruption & System Failures	Execution, Delivery & Process Mgmt	Total	Percent of Total
Corporate Finance	0	0	0	0.2	0	0.1	0.4	0.7	0.3%
Trading & Sales	0	0	0.1	0.2	0	0	56.7	57.0	25.2%
Retail banking	2.8	14.4	0.4	10.8	0.6	0.6	19.1	48.7	21.5%
Commercial Banking	0.3	4.5	1.6	41.5	9.5	7.3	38.2	102.8	45.4%
Payment & Settlement	0	0	0	0	0	0.1	0	0.2	0.1%
Agency Services	0	0	0	1.4	0	0.5	6.8	8.7	3.8%
Asset Mgmt	0	0	0.1	1.1	0	0	2.3	3.5	1.5%
Retail Brokerage	3.0	0	0.0	1.2	0	0.1	0.3	4.6	2.0%
Others	0.4	0	0	0	0	0	0	0.4	0.2%
Total	6.5	18.9	2.2	56.3	10.1	8.8	123.8	226.5	100.0%
Percent of Total	2.9%	8.3%	1.0%	24.8%	4.5%	3.9%	54.6%	100.0%	

Based on stable data, greater than or equal to 1 million yen.

(5) Frequency of Large-Impact Losses

The number of losses that are greater than or equal to 100 million yen (annualized and aggregated across the banks[9]) was 21.6, which was 2.3% of the number of losses greater than or equal to 1 million yen (940.7, annualized and aggregated across the banks)

[8] See footnote 7
[9] See footnote 7

4. Analysis of Loss Data

Previous sections of this paper have provided basic descriptive statistics. In this section, we provide some preliminary statistical analyses aimed at understanding the severity distribution of operational losses. We also provide the frequency of operational losses and the average annual losses in relation to bank size.

Throughout this section, figures are shown as cross-bank medians and interquartile ranges[10] rather than as averages and aggregates of all loss data across the banks. The cross-bank median approach was chosen because of its robustness to outliers. It also preserves data confidentiality. Note that only the 'stable' data are used.

(1) Loss Severity Distribution

Table 4-1a and 4-1b give information about the loss severity distribution.

Table 4-2a shows the loss severity distribution as the percentage of losses within the following severity ranges: 1 million yen - 2 million yen, 2 million yen - 5 million yen, 5 million yen - 10 million yen, 10 million yen - 100 million yen, and 100 million+. The table shows the medians (thus the total percentage of each category is not 100%) and the averages for each category. For example, the cross-bank median of 50.8% for 1 million yen to 2 million yen indicates that the average of the ratio for the 7th bank and the ratio of the 8th bank is 50.8%. The cross-bank average of 50.5% for that category indicates that the average of the ratios for all the banks is 50.5%.

(Table 4-1a) Loss Severity Distribution

Size of Loss	1 million yen - 2 million yen	2 million yen - 5 million yen	5 million yen - 10 million yen	10 million yen - 100 million yen	100 million Yen+
Cross-Bank Medians	50.8%	25.2%	9.8%	10.9%	0.0%
Cross-Bank Averages	50.5%	23.1%	12.9%	11.8%	1.9%

Based on stable data, greater than or equal to 1 million yen.

Table 4-1b shows the loss severity distribution in another way. It presents the 25th, 50th, 75th and 95th percentiles calculated for all the data greater than or equal to 1 million yen in net amount across all business lines and event types. As discussed above, the

[10] Figures from each bank are listed in ascending order. The figure in the middle is the median (In our case, the average of the 7th and 8th figures, as there are 14 banks). The interquartile is a combination of the 25th percentile and 75th percentile. For example, the 25th percentile is the interior division of the ration of 1 to 3 between 4th and 5th figures (e.g. provided that the 4th figure is 40 and the 5th is 50, the 25th percentile is 42.5). In other words, we calculated the 25th and 75th percentile, assigning 0th percentile to the maximum figure and 100th percentile to the minimum figure.

results are reported as cross-bank medians. For example, the cross-bank median for the 95th percentile of 248,204 (100 yen) indicates that the average of the 95th percentile loss severity for the 7th bank and the 8th bank is 248,204 (100 yen). The cross-bank average of 15,473 (100 yen) indicates that the average of the 95th percentile for all the 14 banks is 449,617 (100 yen).

(Table 4-1a) Loss Severity Distribution (Amounts in 100 yen)

	Number of Losses	25th Percentile	50th percentile	75th Percentile	95th Percentile
Cross-Bank Medians	31	14,831	19,395	49,325	248,204
Cross-Bank Averages	289	15,473	26,691	53,478	449,617

Based on stable data, greater than or equal to 1 million yen.

(2) Loss Frequencies in Relation to Bank Size

Table 4-2 shows the frequency of losses exceeding various loss amounts scaled to three measures of bank size: Total Assets, Tier 1 capital, and Gross Income[11]. As was the case with Table 4-1a and 4-1b, the results are presented as cross-bank medians. Interquartile ranges are also shown. Considering the annual number of losses exceeding 1 million yen relative to total assets, Table 4-2 shows that the cross-bank median of this frequency-to-assets ratio is 0.14. That is, a typical (i.e. median) bank experiences 0.14 losses per year exceeding 1 million yen for each 100 billion yen in Total Assets. Table 4-2 also reports the interqurtile range associated with each cross-bank median. The interquartile range is that range of values containing half the banks in the sample, with one quarter of the banks lying below the range, and one quarter lying above. For the annual number of losses exceeding 1 million yen relative to total assets, the interquantile range reported in Table 4-2 indicates that the 5th bank and the 10th bank in that frequency-to-assets ratio falls between 0.08-0.20. Table 4-2 also shows the cross-bank medians of loss frequency divided by Tier 1 capital and those divided by gross Income.

(Table 4-2) Annualized Loss Frequencies as a Percentage of Total Assets, Tier I Capital, and Gross Income

	Losses ≥ 1 million yen	Losses ≥ 2 million yen	Losses ≥ 10 million yen	Losses ≥ 100 million yen
Loss Frequency Divided by Total Assets in 100 Billion Yen.	0.14 (0.08-0.20)	0.08 (0.05-0.10)	0.02 (0.01-0.03)	0 (0-0.0028)
Loss Frequency Divided by Tier I Capital in 100 billion yen	3.37 (1.42-5.27)	1.89 (0.78-2.48)	0.47 (0.15-0.96)	0 (0-0.07)
Loss Frequency Divided by Gross Income in 100 billion yen.	8.10 (5.78-12.00)	4.42 (2.83-6.06)	1.29 (0.50-1.90)	0 (0-0.16)

Based on stable data, greater than or equal to 1 million yen.

For example:

0.14
(0.08-0.20)

← Cross-bank median for the 14 banks
← Interquartile range (25th percentile and 75th percentile for the 14 banks)

[11] Total Assets, Tier 1 Capital, and Gross Income are as of the end of FY2006 (2006/3/31). Note that scaling using those figures is not rigorous but an approximation, as the losses (number and amount) and those scaling factors are not strictly proportional and the relationship between them is not necessarily stable.

(3) Loss Amounts in Relation to Bank Size

Table 4-3 shows the total loss reported by the participating banks, scaled to the same three factors: total assets, Tier 1 capital, and gross income. The first entry in column 1 indicates that the median ratio of the average annual loss to total asset is 0.0016%. That is, the median bank has an average loss of 1.6 million yen for every asset of 100 billion yen. The table also shows interquatile ranges for the ratios of average annual loss to the three scaling factors. That is, the 5th bank and the 10th bank have an annual average loss of between 0.5 million yen and 3.3 million yen for every asset of 100 billion yen.

(Table 4-3) Average Annual Loss (AAL) as a Percentage of Total Assets, Tier 1, and Gross Income

	Losses ≥ 1 million yen	Losses ≥ 2 million yen
AAL Divided by Total Assets	0.0016% (0.0005%-0.0033%)	0.0015% (0.0004%-0.0031%)
AAL Divided by Tier 1 Capital	0.0411% (0.0083%-0.0762%)	0.0392% (0.0066%-0.0735%)
AAL Divided by Gross Income	0.0866% (0.0397%-0.1960%)	0.0813% (0.0349%-0.1915%)

Based on stable data, greater than or equal to 1 million yen.

For example:

0.0016% (0.0005%-0.0033%)	← Cross-bank median for the 14 banks ← Interquartile range (25th percentile and 75th percentile for the 14 banks)

（APPENDIX）Worksheets and instructions for the 2007 Operational Risk Collection Exercise

(Page 1) Instructions
(Page 2) Worksheet for reporting data on individual losses
(Page 3) Worksheet for reporting major scenarios

（1) Instructions for data on reporting individual losses (For Page 2)

In page 2, please fill in the columns from #1 to #11 for each loss as instructed in this page. Only provide information that is available. Please add a sequential reference in the column on the left.

Category	Column#	Item	Remark
Date	1	Date of Discovery	The date when the loss was recognized by the bank.
	2	Date of Occurrence	The date when the loss occurred (The first day for a series of individual losses related to the same operational risk event.)
Amount	3	Gross Loss Amount	Down to one yen (Provide an approximation when the precise number is not available).
	4	Net Loss Amount	Down to one yen (Provide an approximation when the precise number is not available.)
	5	Insurance Recovery	Down to one yen (Provide an approximation when the precise number is not available.)
Description	6	Business Line	Choose from these eight business lines: Retail Banking, Commercial Banking, Payment and Settlement, Agency Services, Asset Management, Retail Brokerage
	7	Event Type	Choose from these seven event types: Internal fraud, External fraud, Employment Practices and Workplace Safety, Clients, Products & Business Practices, Damage to Physical Assets, Business disruption and system failures, Execution, Delivery & Process Management
	8	Place of Occurance	Department, branch office, legal entity (in the case of subsidiary, affiliate, outsoucee etc.) etc.
	9	Credit Related?	0: Other than 1 1: Credit Related
Others	10	Legal Entity	0: Bank, Bank holding company 1: Subsidiary and affiliates 2: Others (i.e. outsourcee)
	11	Domestic/Overseas	0: Domestic 1: Overseas

(2) Instructions for reporting major scenarios (For Page 3)

On page 3, please fill in the columns from #1 to #5 for each senario as instructed in this page. Provide only informaion that is available.

Category	Number	Item	Remark
Data	1	Loss Amount	"Scenario data with 10 largest loss amounts" and "Scenario data with 10 largest loss amounts within the data with their frequency being equal to or more than once in every 1000 years" (As a result, the total number of major scenarios reported will be between 10 to 20.)
	2	Frequency	N: Once in N years (N = the number of years)
Description	3	Business Line	Choose from these eight business lines: Retail Banking, Commercial Banking, Payment and Settlement, Agency Services, Asset Management, Retail Brokerage
	4	Event Type	Choose from these seven event types: Internal fraud, External fraud, Employment Practices and Workplace Safety, Clients, Products & Business Practices, Damage to Physical Assets, Business disruption and system failures, Execution, Delivery & Process Management
	5	Description	Simple description for the scenario

(Appendix) Page 2: Worksheet for reporting data on individual losses　　Name of the Bank(　　)

Category	Date		Loss Amount			Description				Others	
Column #	1	2	3	4	5	6	7	8	9	10	11
(Ref #) 1											
2											
3											
4											
5											
6											
7											
8											
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10											
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(Appendix) Page 3: Worksheet for reporting major scenarios Name of Bank( )

Category	Data		Description		
Column #	1	2	3	4	5
(Ref #) 1					
2					
3					
4					
5					
6					
7					
.					
.					
.					