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The Performance of Mergers between Mutual Banks and Credit Cooperatives in Japan

by

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Abstract: This paper intends to examine the performance of 20 cases of mergers between mutual banks and credit cooperatives occurred between 1969 and 1977. We compared the statistically significant differences of 12 financial ratios before and after merger, and differences of the matching non-merging mutual banks. A financial ratio, deposits per office performs better after merger than before merger, showing positive effect of merger. By using the relative financial ratios, namely the difference of financial ratios between merging and non-merging mutual banks, five ratios which show cost, profitability and productivity provide positive performance of merger.

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I Introduction

Mutual Banks (Sogo Ginko) in Japan were established under the Mutual Bank Law in 1951, which was developed from traditional mutual financing institutions called "Mujin" companies. They were authorized to accept deposits and instalment savings and give loans and discount bills in an assigned business district. In 1953, domestic change, such as checks, drafts, and money order, was added to their business.

However, the amount of instalment savings and lending portion of the mutual banks decreased over the years, and mutual banks became similar to commercial banks. Adams and Hoshii (1972), Tatewaki (1991). A majority of mutual banks became regional banks in April 1989, and in 1992 the last mutual bank, Toho Mutual Bank, was absorbed into Iyo Bank which is a regional bank (Chiho Ginko).

Credit Cooperatives (Shinyō Kyōdokumiai) are co-operative financial institutions based on the mutual support of owners and workers of small firms which are organized under the Law for Small Business Cooperatives. They accept deposits and instalment savings only from their members, people who belong to the household of members, the government, and non-profit organizations.

The performance of mergers between different types of financial institutions has been investigated by Hoshino (1993). He found that

1) merger between credit associations and credit cooperatives produced neutral performance, and
2) merger among credit cooperatives as well as among credit associations produced negative performance.

In this paper, we analyze whether the performance of mergers between different types of financial institutions is positive or not, and whether financial differences exist between merging mutual banks and non-merging mutual banks.

In Section II, data used for the comparison to measure the performance of mergers between mutual banks and credit cooperatives are described as well as the five null hypotheses and the approach used for the analysis of data.

This research analyze data obtained on mutual banks. Mutual banks which merged with credit cooperatives are called merging mutual banks, while those which did not merge with credit cooperative, or other financial institutions are called non-merging mutual banks. The following performance evaluations are made in Section III.

i) merging mutual banks before and after their merger with credit cooperatives (as shown in 1 and 2 in Graph 1)

ii) non-merging mutual banks (as shown in 3 and 4 in Graph 1)

iii) merging mutual banks with non-merging mutual banks (as shown in 1 and 3 as well as 2 and 4 in Graph 1)

General comparisons of financial characteristics between merging and non-merging mutual banks, and general changes in the financial characteristics of mutual banks before and after the year of merger are also analyzed.

The data was analyzed using univariate analysis with F test and t test, and also by discriminant analysis.

Section IV shows the performance of mergers by using the relative financial ratios, namely, the direct differences in the financial variables between merging and paired non-merging mutual banks.

A conclusion is presented in the final section.

II Data, Hypotheses and Approach Used for Analysis

The mutual banks selected are those which merged with credit cooperatives between 1969 and 1977 as shown in Table 1. There are 20 cases of mergers as described in Appendix II. Corresponding to each merging mutual bank, a non-merging mutual bank with the closest size of deposit is chosen, and thus 11 pairs of merging and non-merging mutual banks are provided.

Twelve financial ratios are compiled for the years between 1960 and 1983 to measure the effects of mergers between mutual banks[1] and credit cooperatives. Financial ratios were calculated from financial data obtained.

A comparative ratio analysis is employed to analyze the following five pairs of groups

1. merging mutual banks before and after merger;
2. non-merging mutual banks before and after the year of merger of the matching merging mutual banks;
3. merging and non-merging mutual banks before merger;
4. merging and non-merging mutual banks after merger; and
5. overall merging and non-merging mutual banks.

Five null hypotheses, that there were no financial differences in each comparison listed above are tested using both univariate and discriminant analysis.

The comparison for group 1 shows the effects of mergers, but may also include changes in financial position due to other factors, such as general economic performance and internal growth. The comparison for group 2 presents changes due to factors other than mergers. The comparison in group 3 indicates whether there are differences in the value of the financial ratios between those banks which subsequently merged and those which did not. Likewise, the comparison for group 4 shows the effect of mergers, as well as factors before mergers. The comparison of group 5 gives general comparisons of the financial ratios between merging and non-merging banks including the effects of mergers and also describes the original differences between the two groups before merger.

III The Performance of Mergers

We test differences in each of the 12 financial ratios of merging mutual banks between before and after merger, and those of non-merging mutual banks, the result of which is given in Table 2.

When both merging and non-merging mutual banks have significant differences in their means before and after merger, or both have not, then no change of financial position from before merger to after merger is obtained, i.e., no change caused by the merger.

By comparing column (I) and (II) in Table 2, it is clear that all twelve financial ratios have statistically significant differences in their means, indicating no change of financial position took place between before merger and after merger. However, by comparing column (III) and (IV), the means of financial ratio number 11, deposits per office, is statistically significant. The mean is ¥8800 million for merging mutual banks vs. ¥7660 million for non-merging mutual banks. Therefore, merger brought higher productivity on this ratio, meaning a positive effect of the merger.

Column (V) of Table 2 exhibits general comparisons of financial characteristics between merging and non-merging mutual banks. There is no significant differences in their means, but significant differences in their standard deviations for the following four ratios: ratio number 7, net equity ratio, ratio number 8, loan-deposit ratio, ratio number 10, income ratio before tax, and ratio number 11, deposit per office. The ratio number 7, 8, and 10 have higher values, ratio number 11 has lower figure for non-merging mutual banks, indicating no clear trend is observed for merger.

Column (VI) of Table 2 shows clear differences in the financial ratios of mutual banks before and after mergers, produced by merger, and other internal and external factors.

All twelve financial ratios have statistically significant differences before and after merger in their means and standard deviations. As for means, there are six ratios which improved after the period of merger, and six ratios declined.

Table 3 shows the classification and accuracy of discriminant analysis applied to the same data analyzed by univariate analysis. Each panel is assigned a number which corresponds to the number given in Table 2. In panel I, the number of those merging mutual banks with actual data before merger took place is predicted correctly in 127 cases, and predicted incorrectly for after merger in 0 cases, totalling 127.

The sum of diagonal elements of panel I, 127 + 99 = 226, represents the total number of correctly discriminated cases which, when divided by the total number of cases, 231, yields an accuracy rate of 97.84%.

As shown in panel II, the discrimination of paired non-merging mutual banks before and after the years of merger of merging mutual banks, provides an accuracy rate of 97.40%. The difference between the accuracy rates in panel I and II indicates the presence of the effects of mergers. In panel III, the classification accuracy rate is 56.69% when discriminant analysis applied to the merging and non-merging mutual banks before merger. The accuracy rate increases to 60.10% as shown in panel IV, which indicates the effects of mergers.

General comparison between merging and non-merging mutual banks exhibits the accuracy rate of 56.06%, as shown in panel V. In contrast, the accuracy rate of 97.40% is obtained when comparing mutual banks before and after merger, as shown in panel VI.

Table 4 exhibits the comparison of merging mutual banks before and after merger by year. One year before and after merger, there are four financial ratios without statistically significant difference on their means. They are ratio number 4, yield on total assets, ratio number 5, total assets cost ratio, ratio number 7, net equity ratio, and ratio number 10, income ratio before tax. However, all of them have significant differences in their means after two years before and after merger, which means that these ratios change only one year later, and maintain the differences before and after merger.

The first two ratios, ratio number 4, yield on total assets, and ratio number 5, total assets cost ratio, seem to improve after two years before and after merger. The remaining two ratios, ratio number 7, net equity ratio, and ratio number 10, income ratio before tax, except three years before and after merger, deteriorate. However, the decline may be attributed to factors other than merger.

There are five ratios with significant differences in their means which also improved after one year before and after merger. They are ratio number 6, gross earnings margin to total assets, ratio number 8, loan-deposit ratio, ratio number 9, current expense to current income, ratio number 11, deposit per office, and ratio number 12, deposit per full-time officer and employee. The increase in these ratios may be attributed to factors other than merger.

As far as standard deviations are concerned, ratio number 4, yield on total assets, has significant difference only two years before and after merger. The total assets cost ratio, which is ratio number 5 is not significant only for one year before and after merger. The loan-deposit ratio which is ratio number 8 is not significant for one to three years before and after merger and significant for four and five years before and after merger. Both ratio number 11, deposit per office, and ratio number 12, deposit per full-time officer and employee, is not significant for one and two years but significant for three, four, and five years before and after merger. The other seven ratios do not show any significant change at all.

IV Analysis by the Relative Financial Ratios

The relative financial ratios of mutual banks are compiled from the differences in absolute financial ratios between merging and non-merging mutual banks as follows:

$$d_{ijk} = M_{ijk} - N_{ijk}$$

where,

d_{ijk}: relative financial ratio k (k = 1, ..., 19) of i (i = 1, ..., 11) mutual bank at the jth (j = 1960, ..., 1983) year

M_{ijk}: financial ratio k of i merging mutual bank at the jth year.

N_{ijk}: corresponding financial ratio k of i non-merging mutual bank at the jth year

Table 5 exhibits the comparison of these relative financial ratios before and after merger. For all years, there are five financial ratios with statistically significant differences in their means. The deposit-cost ratio, ratio number 3 has 0.08% and -0.12% as its means before and after merger, respectively. This shows the lower burden of cost after merger, indicating positive effect of merger. The two profitability related ratios, ratio number 4, yield on total assets (-0.04% vs. 0.12%), ratio number 6, gross earnings margin to total assets (-0.03% vs. 0.08%), have higher values after merger, meaning positive performance of merger. The two productivity ratios, ratio number 11, deposit per office, (168 vs. 1140 million yen) and ratio number 12, deposit per full-time officer and employee, (160 vs. 1760 thousand yen) have higher values after merger, showing a positive effect of merger.

Table 5 also shows yearly effect of merger on financial ratios. As for those five ratios with statistically significant differences for all years in their means mentioned above, ratio number three, deposit-cost ratio does not have any statistically significant difference in their means for one to ten years before and after merger, and deposit per full-time officer and employee, ratio number 12 has significant difference nine and ten years before and after merger. The yield on total assets, ratio number 4 and deposit per office, ratio number 11 have significant difference after six to ten years, and gross earnings margin to total assets, ratio number 6 has significant difference after five to ten years before and after merger. Therefore, at least five years are necessary to influence the ratios due to merger.

Other ratios does not have significant differences in their means except ratio number 7, net equity ratio which has significant differences in its means from two to six years before and after merger.

V Conclusion

Based on univariate analysis, we could conclude that firstly, the financial ratio, deposits per office, performs better after merger than before merger showing positive effect of merger. Secondly, yearly comparison of ratios exhibits that there are five ratios such as ratio number 6, gross earnings margin to total assets ratio, ratio number 8, loan-deposit ratio, ratio number 9, ratio of current expense to current income, ratio number 11, deposit per office and ratio number 12, deposit per full-time officer and employee, which have improved one year before and after merger. For two years, three years, four years before and after merger, ratio number 4, yield on total assets and ratio number 5, total assets cost ratio in addition to ratio number 6, 8, 9, 11, and 12 showed improvement as a result of merger. However, ratio number 7, net equity ratio and ratio number 10, income ratio before tax deteriorated temporarily on the surface.

Thirdly, using relative financial ratios for "All Years", it shows that the following ratios, ratio number 3, deposit-cost ratio, ratio number 4, yield on total assets, ratio number 6, gross earnings margin to total assets, ratio number 11, deposit per office, and ratio number 12, deposit per full-time officer and employee improved as a result of merger.

Thus, merger between the different types of financial institution, such as mutual banks and credit cooperatives, exhibits positive effect of merger. However, previous studies have shown that merger among financial institutions of the same type produced negative effects of merger.[2)]

Hoshino (1992b) conducted a survey for the chairmen of the Credit Cooperatives in 1990. It was found that the first objective of merger by a credit cooperative is to improve management efficiency, (57 out of 160 responses or 35.63%), the second objective is to pursue the economies of scale (30.00%), the third objective is to raise the competitive power (13.75%). The result of this survey is completely consistent with the findings reported in this article.

Footnotes

1) The Financial data by Zenkoku Sogo Ginko Kyokai (1977) was used for the period of the first half of the year 1964 to the second half of the year 1972 and that of Nihon Keizai Shimbunsha(1980) was compiled for the period of the first half of 1973 and the second half of 1980. They were added to make yearly data.

2) Hoshino (1988, 1991, 1992a) demonstrated that there are negative effects of merger among the same type of small and medium-sized financial institutions such as credit associations, credit cooperatives and agricultural cooperatives in Japan.

Graph I

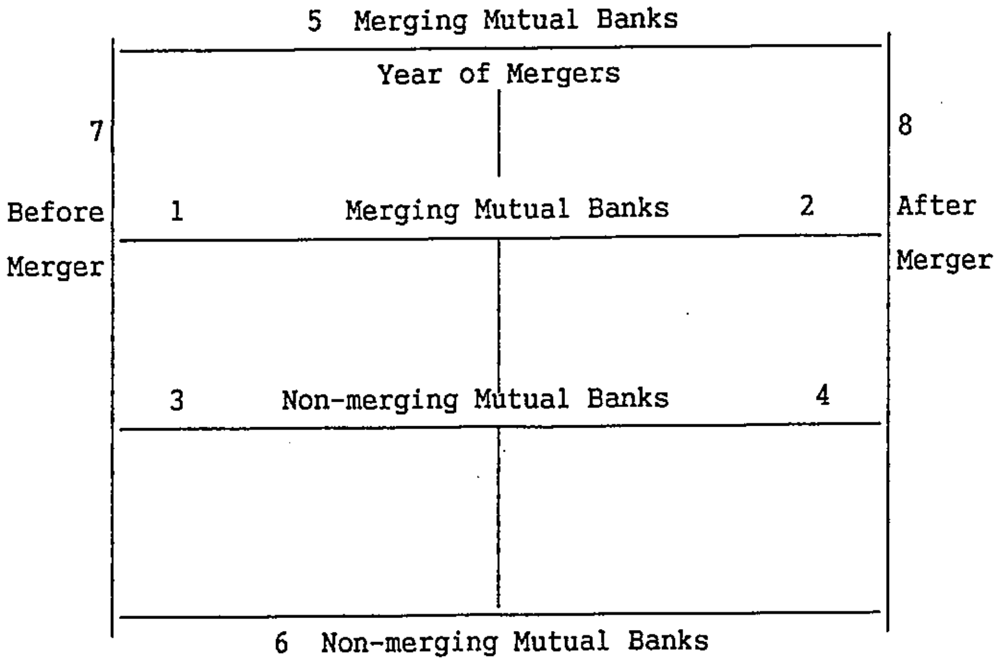
5 Merging Mutual Banks
Year of Mergers
7
8
Before Merger
1
Merging Mutual Banks
2
After Merger
3
Non-merging Mutual Banks
4
6 Non-merging Mutual Banks

Table 1

The Number of Mergers among Small and Medium-sized Financial Institutions after 1968

	Year	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Total
Mergers among same type of financial institutions	Mutual Banks				1																				1
	Credit Associations	1	10	7	13	2		8	4	2	1	1	3	1	4					1			1	3	63
	Credit Cooperatives	1	3	1	4	5	5	4	2		1	4	2	5	2	4	2	3	2	2	4	12	3	6	82
Subtotal		2	13	8	18	7	5	12	6	2	2	5	5	6	6	4	2	3	2	3	4	12	4	9	146
Mergers among different type of financial institutions	Ordinary Banks・Mutual Banks									1								1		1					4
	Ordinary Banks・Credit Cooperatives							1																	1
	Mutual Banks ・Credit Associations		1			1																			2
	Mutual Banks ・Credit Cooperatives		1	4	2	5	6	1			1											1			21
	Credit Associations ・Credit Cooperatives	1	5	1		4			1		1	1							1						16
Subtotal		1	7	5	2	10	6	2	1	1	2	1						1	1	1		1			44
Total of Mergers		3	20	13	20	17	11	14	7	3	4	6	5	6	6	4	2	4	3	4	4	13	4	9	190
Conversions	Mutual Banks →Ordinary Banks	1																1				52	14	1	69
	Credit Cooperative →Mutual Bank			1																					1
	Credit Cooperatives→Credit Associations		1			2																			3
Total of Conversions		1	1	1		2												1				52	14	1	73

Ministry of Finance (1992)

Table 2
Comparison of Merging and Non-merging Mutual Banks

Financial ratios \ classification	Stat.	I			II			III			IV			V			VI		
		Merging			Non-merging			Before Merger			After Merger								
		Before Merger		After Merger	Before Merger		After Merger	Merging MB		Non-merging MB	Merging MB		Non-merging MB	Merging MB		Non-merging MB	Before Merger		After Merger
(1) Yield of interest paid	Means	3.04	c	6.66	3.03	c	6.75	3.04		3.03	6.66		6.75	4.67		4.70	3.03	c	6.71
	Stand.dev.	0.41	c	1.01	0.38	c	1.08	0.41		0.38	1.01		1.08	1.95		2.01	0.39	c	1.05
(2) Expense ratio	Means	2.81	c	3.96	2.75	c	3.98	2.81		2.75	3.96		3.98	3.33		3.30	2.78	c	3.97
	Stand.dev.	0.42	c	0.72	0.42	c	0.71	0.42		0.42	0.72		0.71	0.81		0.83	0.42	c	0.71
(3) Deposit-cost ratio	Means	5.85	c	10.61	5.77	c	10.73	5.85		5.77	10.61		10.73	8.00		8.01	5.81	c	10.67
	Stand.dev.	0.41	c	1.70	0.45	c	1.75	0.41		0.45	1.70		1.75	2.65		2.75	0.43	c	1.72
(4) Yield on total assets	Means	6.58	c	6.18	6.62	c	6.06	6.58		6.62	6.18		6.06	6.40		6.37	6.60	c	6.12
	Stand.dev.	0.73	c	0.58	0.75		0.68	0.73		0.75	0.58		0.68	0.69		0.77	0.74	a	0.63
(5) Total assets cost ratio	Means	5.34	c	2.13	5.34	c	2.09	5.34		5.34	2.13		2.09	3.89		3.88	5.34	c	2.11
	Stand.dev.	0.48		0.74	0.46	c	0.83	0.48		0.46	0.74		0.83	1.71		1.75	0.47	c	0.78
(6) Gross earnings margin to total assets	Means	1.25	c	4.05	1.28	c	3.97	1.25		1.28	4.05		3.97	2.51		2.49	1.26	c	4.01
	Stand.dev.	0.36	c	0.94	0.40	c	0.96	0.36		0.40	0.94		0.96	1.55		1.52	0.38	c	0.94
(7) Net equity ratio	Means	3.96	c	3.23	3.93	c	3.15	3.96		3.93	3.23		3.14	3.63		3.58	3.94	c	3.19
	Stand.dev.	0.63	c	0.67	1.07	c	1.98	0.63	c	1.07	0.67	c	1.99	0.74	c	1.60	0.88	c	1.49
(8) Loan-deposit ratio	Means	60.82	c	78.93	61.74	c	80.10	60.82		61.74	78.93		80.10	68.98		70.10	61.28	c	79.52
	Stand.dev.	8.68	c	4.54	11.14	c	6.87	8.68	c	11.14	4.54	c	6.67	11.49	a	13.10	9.98	c	5.72
(9) Ratio of current expense to current income	Means	81.30	c	34.74	81.01	c	34.62	81.30		81.01	34.74		34.62	60.33		60.12	81.15	c	34.68
	Stand.dev.	3.81	c	13.12	4.12	c	13.43	2.81		4.12	13.12		13.44	24.98		25.00	3.76	c	13.24
(10) Income ratio before tax	Means	19.42	c	8.87	19.74	c	9.07	19.42		19.74	8.87		9.07	14.67		14.94	19.58	c	8.97
	Stand.dev.	8.03	c	2.56	8.56	c	15.85	8.03		8.56	2.56	c	15.85	8.12	c	13.45	8.28	c	11.33
(11) Deposit per office	Means	2071	c	8800	1903	c	7660	2071		1903	8800	c	7660	5100		4495	1987	c	8230
	Stand.dev.	1222	c	2769	1128	c	1881	1222		1128	2769	c	1881	3938	b	3243	1176	c	2429
(12) Deposit per full-time officer and employee	Means	590	c	2916	574	c	2740	590		574	2916		2740	1637		1549	582	c	2828
	Stand.dev.	330	c	900	326	c	819	330		326	900		819	1330		1235	327	c	863

1) a indicates the statistically significant difference at the 5% level;b at the 1% level,
c at the 0.1% level.

2) Ratios 1~10 are expressed in %, ratio number 11 is in million yen, and ratio number 12 is in ten thousands yen.

Table 3

Classification and Accuracy of Merging and Non-merging Mutual Banks by Discriminant Analysis

I Before and After of Merging MB

Actual \ Predicted	Before Merger	After Merger	Total
Before Merger	127	0	127
After Merger	5	99	104
Total	132	99	231
Accuracy = 97.84%			

II Before and After Merger of Non-merging MB

Actual \ Predicted	Before Merger	After Merger	Total
Before Merger	127	0	127
After Merger	6	98	104
Total	133	98	231
Accuracy = 97.40%			

III Merging and Non-merging MB Before Merger

Actual \ Predicted	Merging MB	Non-merging MB	Total
Merging MB	70	57	127
Non-merging MB	53	74	127
Total	123	131	254
Accuracy = 56.69%			

IV Merging and Non-merging MB After Merger

Actual \ Predicted	Merging MB	Non-merging MB	Total
Merging MB	65	39	104
Non-merging MB	44	60	104
Total	109	99	208
Accuracy = 60.10%			

V Merging and Non-merging MB

Actual \ Predicted	Merging MB	Non-merging MB	Total
Merging MB	116	115	231
Non-merging MB	88	143	231
Total	204	258	462
Accuracy = 56.06%			

VI Before and After Merger

Actual \ Predicted	Before Merger	After Merger	Total
Before Merger	254	0	254
After Merger	12	196	208
Total	266	196	462
Accuracy = 97.40%			

Table 4
Yearly Comparsion of Merging Mutual Banks Before and After Merger

Financial ratios	Stat. \ period \ Years	One Year Before Merger		One Year After Merger	Two Years Before Merger		Two Years After Merger	Three Years Before Merger		Three Years After Merger	Foure Years Before Merger		Foure Years After Merger	Five Years Before Merger		Five Years After Merger
(1) Yield of interest paid	Means	3.43	b	6.01	3.40	c	6.46	3.38	c	6.61	3.35	c	6.66	3.29	c	6.61
	Stand.dev.	0.21	c	2.03	0.22	c	1.69	0.20	c	1.53	0.19	c	1.35	0.22	c	1.26
(2) Expense ratio	Means	2.50	a	3.43	2.52	c	3.78	2.56	c	3.91	2.58	c	3.93	2.60	c	3.87
	Stand.dev.	0.18	c	1.20	0.25	c	1.02	0.28	c	0.95	0.31	c	0.87	0.33	c	0.83
(3) Deposit-cost ratio	Means	5.93	b	9.44	5.92	c	10.24	5.94	c	10.52	5.92	c	10.59	5.89	c	10.48
	Stand.dev.	0.31	c	3.22	0.30	c	2.69	0.32	c	2.45	0.35	c	2.19	0.39	c	2.06
(4) Yield on total assets	Means	5.93		6.43	5.98	b	6.51	6.03	c	6.49	6.05	c	6.43	6.07	c	6.32
	Stand.dev.	0.40		0.73	0.38	a	0.63	0.41		0.58	0.44		0.57	0.50		0.60
(5) Total assets cost ratio	Means	5.03		3.22	5.06	c	2.78	5.09	c	2.64	5.09	c	2.50	5.09	c	2.41
	Stand.dev.	0.34		1.41	0.35	c	1.23	0.37	c	1.14	0.39	c	1.03	0.44	c	0.95
(6) Gross earnings margin to total assets	Means	0.90	b	3.21	0.92	c	3.73	0.95	c	3.85	0.96	c	3.92	0.98	c	3.91
	Stand.dev.	0.13	c	1.92	0.13	c	1.66	0.12	c	1.50	0.12	c	1.34	0.12	c	1.22
(7) Net equity ratio	Means	3.99		3.47	3.98	b	3.46	4.00	c	3.42	4.00	c	3.40	4.01	c	3.38
	Stand.dev.	0.72		0.66	0.65		0.62	0.60		0.60	0.59		0.59	0.60		0.60
(8) Loan-deposit ratio	Means	61.82	c	77.47	61.65	c	76.65	61.56	c	77.27	61.52	c	77.65	61.26	c	78.05
	Stand.dev.	9.15		7.39	8.59		6.75	8.38		5.95	8.44	b	5.59	8.59	c	5.25
(9) Ratio of current expense to current income	Means	84.87	b	52.00	84.56	c	44.18	84.32	c	41.78	84.06	c	39.75	83.82	c	38.76
	Stand.dev.	1.72	c	26.75	2.00	c	23.28	1.84	c	21.25	1.78	c	19.03	1.75	c	17.27
(10) Income ratio before tax	Means	13.09		11.93	13.30	a	11.76	13.57	a	16.44	13.74	c	10.89	13.83	c	10.42
	Stand.dev.	2.06		2.44	2.01		2.38	2.19		2.36	2.35		2.55	2.34		2.58
(11) Deposit per office	Means	3861	a	5773	3576	c	6186	3311	c	6562	3112	c	6926	2936	c	7249
	Stand.dev.	1413		1729	1283		1778	1215	a	1916	1186	c	2086	1177	c	2205
(12) Deposit per full-time officer and employee	Means	1136	c	1827	105	c	193	973	c	2038	915	c	2150	862	c	2262
	Stand.dev.	322		411	298		420	297	a	449	299	c	504	301	c	550

1) a indicates the statistically significant difference at the 5% level;b at the 1% level,
c at the 0.1% level.
2) Ratios 1~10 are expressed in %, ratio number 11 is in million yen, and ratio number 12 is in ten thousands yen.

Table 5
Yearly Comparsion of Merging Mutual Banks by Relative Financial Ratios

Financial ratios	Stat.	All Years Before Merger		All Years After Merger	One Year Before Merger		One Year After Merger	Two Years Before Merger		Two Years After Merger	Three Years Before Merger		Three Years After Merger	Four Years Before Merger		Four Years After Merger	Five Years Before Merger		Five Years After Merger
(1) Yield of interest paid	Means	0.02		-0.10	0.11		0.15	0.07		0.07	0.07		0.06	0.05		0.05	0.03		0.04
	Stand.dev.	0.39	c	0.66	0.30		0.35	0.27	a	0.45	0.25	c	0.46	0.23	c	0.53	0.23	c	0.55
(2) Expense ratio	Means	0.06		-0.02	0.49		-0.08	0.04		-0.04	0.05		-0.02	0.04		0.04	0.04		0.01
	Stand.dev.	0.49	c	0.29	0.32		0.32	0.38		0.26	0.38	a	0.25	0.40	b	0.26	0.40	c	0.25
(3) Deposit-cost ratio	Means	0.08	a	-0.12	0.16		0.08	0.11		0.03	0.12		0.04	0.09		0.05	0.07		0.05
	Stand.dev.	0.54	c	0.87	0.37		0.57	0.44		0.57	0.43		0.57	0.45	a	0.67	0.45	b	0.70
(4) Yield on total assets	Means	-0.04	a	0.12	0.12		0.10	0.07		0.13	0.04		0.13	-0.01		0.13	-0.05		0.14
	Stand.dev.	0.56		0.54	0.57		0.48	0.60		0.50	0.59		0.50	0.57		0.51	0.56		0.51
(5) Total assets cost ratio	Means	-0.01		0.04	-0.14		0.07	0.08		0.05	0.07		0.03	0.02		0.04	-0.02		0.04
	Stand.dev.	0.50	c	0.33	0.53		0.43	0.55		0.38	0.53		0.38	0.51	a	0.36	0.52	b	0.35
(6) Gross earnings margin to total assets	Means	-0.03	a	0.08	-0.03		0.03	-0.01		0.08	-0.03		0.09	-0.03		0.10	-0.03	a	0.09
	Stand.dev.	0.22	c	0.40	0.22		0.35	0.20	c	0.43	0.18	c	0.44	0.17	c	0.43	0.15	c	0.42
(7) Net equity ratio	Means	0.03		0.08	0.17		-0.55	0.14	a	-0.50	0.16	b	-0.47	0.18	c	-0.46	0.20	c	-0.45
	Stand.dev.	1.13	c	1.99	0.96		0.91	0.93		0.88	0.80		0.89	0.73		0.90	0.72		0.92
(8) Loan-deposit ratio	Means	-0.91		-1.17	-2.24		-2.44	-1.46		-2.41	-1.18		-1.97	-1.16		-1.42	-1.06		-1.03
	Stand.dev.	13.56	c	7.03	6.04		5.33	6.56		4.65	8.10	c	4.32	8.81	c	4.55	9.13	c	4.69
(9) Ratio of current expense to current income	Means	0.29		0.11	0.72		0.44	0.36		0.20	0.53		0.20	0.46		0.19	0.33		0.17
	Stand.dev.	2.68	c	3.71	3.36		3.49	3.04		3.89	2.65	a	3.99	2.42	c	4.01	2.30	c	3.95
(10) Income ratio before tax	Means	-0.32		-0.20	-1.07		-0.63	-1.32		-0.03	-1.11		0.17	-1.01		0.12	-0.95		0.12
	Stand.dev.	7.31	c	15.70	3.46		2.52	3.11		2.46	3.37		2.44	3.89	b	2.52	3.98	b	2.52
(11) Deposit per office	Means	168	c	1140	214		379	173		455	131		536	128		596	126		660
	Stand.dev.	805	c	2050	1082		1687	1023	a	1667	982	b	1756	946	c	1814	909	c	1845
(12) Deposit per full-time officer and employee	Means	16	b	176	47		116	49		107	1		94	5		83	10		75
	Stand.dev.	96	c	507	91		172	106	c	235	116	c	260	122	c	297	123	c	331

1) a indicates the statistically significant difference at the 5% level;b at the 1% level,
c at the 0.1% level.
2) Ratios 1~10 are expressed in %, ratio number 11 is in million yen, and ratio number 12 is in ten thousands yen.

Table 5 Continued

Financial ratios	Stat. \ period \ Years	Six Years Before Merger		Six Years After Merger	Seven Years Before Merger		Seven Years After Merger	Eight Years Before Merger		Eight Years After Merger	Nine Years Before Merger		Nine Years After Merger	Ten Years Before Merger		Ten Years After Merger
(1) Yield of interest paid	Means	0.02		0.02	0.02		-0.02	0.03		-0.06	0.03		-0.09	0.00		-0.10
	Stand.dev.	0.25	c	0.59	0.26	c	0.62	0.28	c	0.64	0.31	c	0.67	0.34	c	0.66
(2) Expense ratio	Means	0.04		0.01	0.05		-0.01	0.04		-0.03	0.02		-0.03	0.02		-0.03
	Stand.dev.	0.40	c	0.25	0.42	c	0.25	0.46	c	0.26	0.48	c	0.27	0.49	c	0.28
(3) Deposit-cost ratio	Means	0.06		0.03	0.07		-0.04	0.07		-0.09	0.05		-0.12	0.02		-0.13
	Stand.dev.	0.45	c	0.25	0.45	c	0.78	0.47	c	0.82	0.48	c	0.87	0.51	c	0.86
(4) Yield on total assets	Means	-0.06	a	0.15	-0.05	a	0.14	-0.05	a	0.13	-0.06	a	0.13	-0.07	a	0.12
	Stand.dev.	0.56		0.53	0.54		0.53	0.54		0.55	0.55		0.56	0.57		0.55
(5) Total assets cost ratio	Means	-0.03		0.05	-0.02		0.04	-0.03		0.04	-0.04		0.04	-0.05		0.04
	Stand.dev.	0.51	b	0.35	0.49	b	0.34	0.49	c	0.34	0.49	c	0.34	0.50	c	0.34
(6) Gross earnings margin to total assets	Means	-0.03	a	0.10	-0.02	a	0.10	-0.02	a	0.09	-0.02	a	0.08	-0.03	a	0.08
	Stand.dev.	0.11	c	0.42	0.15	c	0.42	0.16	c	0.42	0.17	c	0.42	0.20	c	0.41
(7) Net equity ratio	Means	0.09	b	-0.43	0.09		-0.29	0.09		-0.16	0.07		-0.08	0.06		0.00
	Stand.dev.	1.12		0.91	1.11		1.46	1.09	c	1.74	1.08	c	1.90	1.09	c	1.96
(8) Loan-deposit ratio	Means	-1.09		-0.87	-1.69		-1.06	-1.18		-1.17	-0.83		-1.13	-0.73		-1.09
	Stand.dev.	9.38	c	4.72	11.71	c	5.20	12.00		5.58	12.42	c	6.26	12.56	c	6.68
(9) Ratio of current expense to current income	Means	0.23		0.09	0.22		0.08	0.15		0.10	0.08		0.15	0.13		0.12
	Stand.dev.	2.28	c	3.87	2.23	c	3.80	2.23	c	3.78	2.31	c	3.78	2.53	c	3.78
(10) Income ratio before tax	Means	-0.70		0.50	-0.31		-1.54	-0.07		-1.17	-0.25		-0.88	-0.34		-0.47
	Stand.dev.	4.74		3.95	4.76	c	18.29	4.78	c	17.27	5.35	c	16.45	6.06	c	15.95
(11) Deposit per office	Means	133	a	761	140	a	860	147	a	950	148	c	1038	152	c	1129
	Stand.dev.	894	c	1949	876	c	1995	858	c	2034	843	c	2063	828	c	2109
(12) Deposit per full-time officer and employee	Means	14		83	16		111	16		133	16	a	144	16	b	164
	Stand.dev.	119	c	367	114	c	408	109	c	444	104	c	488	102	c	506

1) a indicates the statistically significant difference at the 5% level;b at the 1% level,
c at the 0.1% level.

2) Ratios 1~10 are expressed in %, ratio number 11 is in million yen, and ratio number 12 is in ten thousands yen.

Appendix I

Financial Ratios Analyzed

(1) Yield of interest paid = interest paid/deposit x 100

(2) Expense ratio = (personnel expenses + nonpersonnel expenses + tax)/deposit x 100

(3) Deposit-cost ratio = yield of interest paid + expense ratio

(4) Yield on total assets = recurring profit/total assets x 100

(5) Total assets cost ratio = ordinary expenditure/total assets x 100

(6) Gross earnings margin to total assets = yield on total assets - total assets cost ratio

(7) Net equity ratio = equity/total assets x 100

(8) Loan-deposit ratio = loan/deposit x 100

(9) Ratio of current expense to current income = current expense/current income

(10) Income ratio before tax = current income before tax/total assets x 100

(11) Deposit per office = deposit/number of offices

(12) Deposit per full-time officer and employee = deposit/number of officers and employees

Appendix II

A list of Merging Mutual Banks and
Credit Cooperatives and Non-Merging Mutual Banks

Prefecture	Merging M.B. Merged C.C.	Period of Merger	Name after Merger	Non-merging M.B.
(1) Aichi	Nagoya M.B. Chuō C.C.	4/1/69	1)Nagoya M.B.	1)Fukuoka M.B.
(2) Aichi	Nagoya M.B. Toyohashi Shimin C.C.	4/1/70	1)Nagoya M.B.	
(3) Hiroshima	Hiroshima M.B. Hiroshima Kanei C.C.	10/1/70	2)Hiroshima M.B.	2)Hokuyo M.B.
(4) Tokyo	Tokyo M.B. Tokyo Chochiku C.C.	10/1/70	3)Tokyo M.B.	3)Hyogo M.B.
(5) Aichi	Chukyo M.B. Ama C.C.	11/1/70	4)Chukyo M.B.	4)Daikō M.B.
(6) Aichi	Nagoya M.B. Bihoku C.C.	4/1/71		
(7) Aichi	Chuō M.B. Showa C.C.	4/1/71	5)Chuō M.B.	5)Ehime M.B.
(8) Aichi	Nagoya M.B. Onōmachi C.C.	4/1/71	1)Nagoya M.B.	
(9) Aichi	Chukyo M.B. Nagoya Shoko	4/1/71	4)Chukyo M.B.	
(10)Fukuoka	Fukuoka M.B. Fukuokaken Dai-ichi C.C.	5/1/72	6)Fukuoka M.B.	6)Tokiwa M.B.
(11)Fukuoka	Nishi Nippon M.B. Tukushi Chuō C.C.	1/13/73	7)Nishi Nippon M.B.	7)Koufuku M.B.
(12)Fukuoka	Fukuoka M.B. Kogōri C.C.	2/1/73	6)Fukuoka M.B.	
(13)Gumma Tokyo	Ōkawa M.B. Fukagawa C.C.	4/1/73	8)Daisho M.B.	8)Dai-San M.B.
(14)Aichi	Chuō M.B. Shinano C.C.	4/1/73	5)Chuō M.B.	
(15)Aomori	Hirosaki M.B. Seinan C.C.	8/1/73	9)Hirosaki M.B.	9)Kansai M.B.
(16)Osaka	Kinki M.B. Kokumin C.C.	2/1/74	10)Kinki M.B.	10)Tokuyo M.B.
(17)Fukuoka	Fukuoka M.B. Chikugo C.C.	2/1/74	6)Fukuoka	
(18)Tokyo	Tokyo M.B. Tokyo Ishi C.C.	2/1/74	3)Tokyo M.B.	
(19)Tokyo	Heiwa M.B. Hukutoku C.C.	4/1/74	11)Heiwa M.B.	11)Chiba M.B.
(20)Gumma Tokyo	Daisho M.B. Akabane C.C.	4/1/77	8)Daisho M.B.	

1) Original list is from Mori (1987).
2) Numbers in the fourth and fifth column are paired sample numbers.

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