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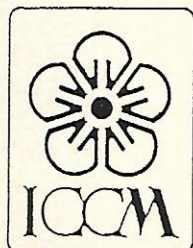
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AN ANALYSIS OF MERGERS AMONG CREDIT COOPERATIVES IN JAPAN

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ABSTRACT

The performance of mergers among credit cooperatives in Japan is examined with 11 pairs of merging and non-merging credit cooperatives based on each prefecture. Nineteen financial ratios made by adding figures of each original financial variables between merging and merged credit cooperatives are compiled for the years between 1969 and 1987 to measure the effects of mergers.

By comparing the statistically significant differences of the 19 financial ratios of credit cooperatives before and after merger, and differences of the matching non-merging credit cooperatives before and after merger, we could find that the effect of mergers on the performance of credit cooperatives is negative.

Relative financial ratios which are compiled from the differences in absolute financial ratios between merging and non-merging credit cooperatives brought the same conclusion.

Secondly, generally speaking, merging credit cooperatives show rather inferior financial characteristics to non-merging credit cooperatives.

I INTRODUCTION

Credit Cooperatives in Japan were established in 1900 based on the Industrial Cooperatives Law. Its objective was mutual financing in cooperative form by small and medium-sized cooperative organizations.

After the Second World War, the majority of the 636 credit cooperatives were converted into credit associations based on the cooperative union law for small and medium-sized firms. The remaining 74 credit cooperatives remain unconverted, mainly under the control of prefectural or metropolitan governments. Later, the number of credit cooperatives increased to 527 by March 1965. Following the reports of the Investigative Committee on Financial Institutions, the so-called "Two Financial Laws", namely the "Law on Reforming a Part of the Mutual Loan and Savings Banks and Credit Associations Sectors etc." and the "Law on Mergers and Conversions among Financial Institutions" were enacted. The former is to cope with internationalization and improving efficiency. The latter is to promote financial reorganization in order to raise efficiency not only among the same type, but also among different types of financial institutions, in which mergers had not previously been permitted under any law.

Following the enactment of these laws, there were 127 mergers among the same type of financial institutions, including 58 mergers for Credit Cooperatives and 68 for Credit Associations and only one for Mutual Loan and Savings Banks. Among the different types of financial institutions, there were 21 mergers between Credit Cooperatives and Mutual Loan and Savings Banks, 15 between Credit Cooperatives and Credit Associations, and only one between Credit Cooperatives and Ordinary Banks. The dissolution rate for Credit Cooperatives among small and medium-sized financial institutions is  $142/214 = 66.4\%$ .

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It is believed that the local administrative authorities guided and mediated mergers among Credit Cooperatives to save Credit Cooperatives with a rather weak financial basis from bankruptcy.

Moreover, there were three Conversions from Credit Cooperatives to Credit Associations, and one to a Mutual Loan and Savings Bank.

The latest statistics<sup>1)</sup> report that as of October 1989 there were 414 Credit Cooperatives, with 2,934 offices, 45,490 full time officers and employees, and 3,744,088 members.

The ordinary banks, namely city banks and regional banks, are increasing in number, rising from 48.14% with 71,091 billion Yen of loans in 1983, to 59.90%, with 145,024 billion Yen of loans in 1988.

While the balance of loans for small and medium-sized financial institutions, mutual loan and savings banks, credit associations, credit cooperatives and governmental financial institutions for small and medium-sized firms is increasing, the percentage of the breakdown is always decreasing. Credit cooperatives especially decreased from 5.50% in 1983 to 4.53% in 1988.

The Report of the Investigative Committee on Financial Institutions<sup>2)</sup>, an advisory organ of the Ministry of Finance, stressed the necessity of enlarging cooperative financial institutions through mergers in order to strengthen their financial basis, and to obtain the necessary competitive power to cope with financial liberalization and internationalization. However, no empirical research has revealed that temporal enlargement by merger leads to a strengthening of the management base or an increase in competitive power.

The National Central Association of Credit Cooperatives revealed the results of a questionnaire survey about the motives behind their mergers and the financial condition of 35 credit cooperatives which had experienced mergers among the same type of financial institutions.

Twenty one of them improved their situation, to strengthen the management base as the No.1 reason, and coped with the increasing cost of investment in machines and the increase in the size of loans to local small and medium-sized firms. Over 40% of credit cooperatives acknowledged the positive effects of mergers.

Hoshino [8, 11] showed that the effect of mergers is negative among credit associations and that the financial characteristics of merging credit associations are inferior to those of non-merging credit associations. The same results among firms listed on the Stock Exchange are exhibited in a series of his study in [2, 3, 4, 6].

In this paper, we analyse whether the performance of mergers is positive or not and whether financial differences between merging credit cooperatives and non-merging credit cooperatives exist or not.

Section II describes data used for the comparison to measure the performance of mergers among credit cooperatives with five null hypotheses and approach employed.

In Section III, the comparison between before and after merger among merging credit cooperatives corresponding to ① - ② in



Graph I

① Merging Credit Cooperatives

①	Year of Merger		②
	①	Merging Credit Cooperatives	
Before Merger	①'	Merged Credit Cooperatives	total
③	Non-merging Credit Cooperatives		④
	③	Non-merging Credit Cooperatives	
④ Non-merging Credit Cooperatives			

comparison in group 3 indicates whether there are differences in the value of the financial ratios between those cooperatives which subsequently merge and those that do not prior to any effects of mergers. Likewise, group 4 shows the effect of mergers, as well as including the differences in financial ratios between merging and non-merging cooperatives before mergers. Group 5 gives general comparisons of the financial ratios between merging and non-merging cooperatives including the effects of mergers and also describes the original differences between the two groups before merger.

III THE PERFORMANCE OF MERGERS

We test the differences of each of the 19 financial ratios of merging credit cooperatives before and after merger, the result of which is given in column (I) of Table 1. There are 10 financial ratios which have statistically significant differences on their means between the two groups.

Those ratios with lower performance after merger than before merger are (3) yield on loan (8.67% → 8.28%), (9) gross earnings margin of deposit to loan (1.58% → 1.04%), (12) gross earnings margin to total assets (1.02% → 0.60%), (13) net equity ratio (0.07% → 0.05%), (15) ratio of current expense to current income (86.08% → 91.67%) and (16) income ratio after tax (13.40% → 9.30%), all of which indicate the negative effects of mergers. While, those ratios with higher performance after merger than before merger are (1) yield of interest received (4.75% → 5.39%), and three ratios of productivity, (17) deposit per office, (18) deposit per full-time officer and employee and (19) deposit per cooperative's member. It is quite natural, however, that three of the productivity ratios increased after merger, reflecting general economic growth and inflation over a long period of years between 1969 and 1988.

The matching 11 non-merging credit cooperatives are compared before and after merger as shown in column (II) of Table 1. By comparing them with the previous result, those ratios, with a statistically significant difference on their means which suffered financial disadvantages after merger are (3) yield on loan, (9) gross earnings margin of deposit to loan, (12) gross earnings margin to total assets, (15) ratio of current expense to current income, and (16) income ratio after tax, meaning negative effects of mergers. The ratio which gains financial advantage is (1) yield of interest received. Those ratios with no change in financial advantages are (13) net equity ratio and three ratios of productivity. (6) The non-personnel expenses ratio has a statistically significant difference on its means in the comparison of only non-merging credit cooperatives. Before merger the mean is 0.77% and after merger 0.68%, showing the increasing efficiency of cost reduction without merger and no difference between corresponding merging cooperatives, indicating the negative efficiency of mergers.

As far as the standard deviations are concerned, (2) yield of interest paid has a statistically significant difference at the 5% level with the financial ratios of 0.78% vs. 0.59% for merging credit cooperatives before and after merger, respectively. However, this difference disappears for matching non-merging credit cooperatives, indicating the stabilizing effects of mergers on this ratio. Just the opposite trend is observed on (3) yield on loan.

There are four ratios, (12) gross earnings margin to total assets, (15) ratio of current expense to current income, (17) deposit per office, and (18) deposit per full-time officer and employee, which have statistically significant differences on their standard deviations for non-merging credit cooperatives, but not for merging credit cooperatives, with a higher value after merger, meaning the stabilizing effects of mergers.

Next is the comparative analysis of merging and non-merging credit cooperatives before mergers, and after mergers as shown in columns (III) and (IV) of Table 1.

Graph I, and the comparison between before and after for non-merging credit cooperatives corresponding to ③ - ④ in the graph are conducted by univariate analysis with F test and t test, and also by discrimination analysis, relatively.

The same relative comparisons are applied between merging credit cooperatives and non-merging credit cooperatives before merger corresponding to ① - ③ in the graph, and between merging credit cooperatives and non-merging credit cooperatives after merger corresponding to ② - ④ in the graph.

Section IV shows the performance of mergers by using the relative financial ratio, namely, the direct differences in the financial variables between merging and paired non-merging credit cooperatives. Additionally, general comparisons of financial characteristics between merging and non-merging credit cooperatives, and general changes in the financial characteristics of credit cooperatives before and after the year of merger are analyzed.

II DATA, HYPOTHESES AND APPROACH

The Credit Cooperatives analyzed are taken only from the mergers of two credit cooperatives which merged between 1974 and 1981, out of a total numbering 22. Corresponding to each merging credit cooperative, a non-merging credit cooperative with the nearest size of deposit in the same prefecture or metropolitan area is chosen in order to make a pair for comparison.'

Nineteen financial ratios are compiled for the years between 1969 and 1987 to measure the effects of mergers among credit cooperatives. The added figures of each original financial variable between merging and merged credit cooperatives are used to make the financial ratios of merging credit cooperatives before merger.

A comparative ratio analysis is employed to analyze groups of:

1. merging credit cooperatives before and after merger;
2. non-merging credit cooperatives before and after the year of merger of merging cooperatives;
3. merging and non-merging credit cooperatives before merger;
4. merging and non-merging credit cooperatives after merger; and
5. overall merging and non-merging credit cooperatives.

Five null hypotheses, that there were no financial differences between them for each pair of groups, are tested using both univariate and multivariate analysis.

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. Group 2 presents changes due to factors other than mergers. The



Table 1 Comparison of Merging and Non-merging Credit Cooperatives before and after Mergers

Financial ratio	(I) Merging Credit Cooperatives		(II) Non-merging Credit Cooperatives		(III) Before Merger		(IV) After Merger		(V) Overall	
	Before Merger	After Merger	Before Merger	After Merger	Merging C.C.	Non-merging C.C.	Merging C.C.	Non-merging C.C.	Merging C.C.	Non-merging C.C.
(1) Yield of interest received	4.75 0.94	c 5.39 0.88	4.41 1.56	4.91 1.21	4.75 0.94	4.41 1.56	5.39 0.88	a 4.91 1.21	5.07 0.96	a 4.66 c 1.41
(2) Yield of interest paid	4.11 0.78	a 4.31 0.59	4.01 0.82	4.15 0.64	4.11 0.78	4.01 0.82	4.31 0.59	4.15 0.64	4.21 0.69	4.08 0.73
(3) Yield on loan	8.67 0.83	a 8.28 c 1.23	8.31 1.09	8.01 1.01	8.67 0.83	a 8.31 1.09	8.28 1.23	8.01 1.01	8.48 1.06	a 8.16 c 1.05
(4) Expense ratio	2.99 0.50	a 2.94 c 0.55	2.65 0.56	2.52 0.77	2.99 0.50	c 2.65 0.56	2.94 0.55	c 2.52 a 0.77	2.96 0.52	c 2.58 b 0.67
(5) Personnel expenses ratio	2.14 0.34	a 2.10 0.46	1.76 0.55	1.75 0.74	2.14 0.34	c 1.76 0.55	2.10 0.46	c 1.75 c 0.74	2.12 0.40	c 1.76 c 0.65
(6) Non-personnel expenses ratio	0.71 0.23	a 0.74 0.17	0.77 0.17	b 0.68 0.15	0.71 0.23	a 0.77 0.17	0.74 0.17	0.68 0.15	0.73 0.20	a 0.73 0.16
(7) Tax ratio	0.13 0.11	a 0.10 0.08	0.12 0.12	c 0.08 0.08	0.13 0.11	0.12 0.12	0.10 0.08	0.08 0.08	0.12 0.09	0.10 0.10
(8) Deposit-cost ratio	7.10 0.88	a 7.24 0.77	6.65 1.09	6.67 1.20	7.10 0.88	a 6.65 1.09	7.24 0.77	c 6.67 c 1.20	7.17 0.83	c 6.66 c 1.14
(9) Gross earnings margin of deposit to loan	1.58 0.61	c 1.04 c 1.02	1.65 0.88	1.34 0.70	1.58 0.61	a 1.65 0.88	1.04 1.02	b 1.34 0.70	1.31 0.88	1.50 0.80
(10) Yield on total assets	7.33 0.71	a 7.18 0.73	7.07 0.86	6.97 0.83	7.33 0.71	a 7.07 0.86	7.18 0.73	6.97 0.83	7.26 0.72	7.02 0.84
(11) Total assets cost ratio	6.31 0.73	a 6.58 0.80	6.11 0.96	6.15 0.95	6.31 0.73	a 6.11 0.96	6.58 0.80	a 6.15 0.95	6.45 0.77	b 6.13 b 0.95
(12) Gross earnings margin to total assets	1.02 0.38	c 0.60 0.43	0.96 0.31	a 0.82 0.42	1.02 0.38	0.96 0.31	0.60 0.43	b 0.82 0.42	0.81 0.46	a 0.89 a 0.38
(13) Net equity ratio	0.07 0.04	c 0.05 c 0.02	0.09 0.06	c 0.05 c 0.04	0.07 0.04	c 0.05 c 0.04	0.05 0.02	0.05 0.04	0.06 0.03	0.07 c 0.06
(14) Loan-deposit ratio	78.26 9.38	a 74.53 9.85	73.23 14.19	69.93 17.67	78.26 9.38	a 73.23 14.19	74.53 9.85	c 69.93 17.67	76.39 9.76	b 71.57 c 16.05
(15) Ratio of current expense to current income	86.08 5.02	c 91.67 5.88	86.18 4.59	88.03 6.27	86.08 5.02	86.18 4.59	91.67 5.88	c 88.03 6.27	88.87 6.12	a 87.11 5.56
(16) Income ratio after tax	13.40 4.42	c 9.30 4.42	13.88 5.88	11.81 5.05	13.40 4.42	a 13.88 5.88	9.30 4.42	b 11.81 5.05	11.35 4.86	a 12.84 5.55
(17) Deposit per office	1986 1488	c 3235 1903	3377 2174	c 5720 3157	1986 1488	c 3377 2174	3235 1903	c 5720 3157	2611 1812	c 4559 c 2947
(18) Deposit per full-time officer and employee	1129 485	c 1859 551	1683 859	c 2819 1262	1129 485	c 1683 859	1859 551	c 2819 1262	1494 634	c 2256 c 1218
(19) Deposit per cooperative's member	1837 1218	c 2825 1639	1810 1356	c 3073 2040	1837 1218	1810 1356	2825 1639	3073 2040	2331 1521	c 2447 a 1840

1) a indicates the statistically significant difference at the 5% level; b at the 1% level, c at the 0.1% level.  
 2) A unit of (1)-(16) is ¥, (17) million Yen, (18) ten thousands yen, (19) thousand yen.  
 3) First row of figures = means, second row of figures = standard deviations.

Table 2 Comparison of Merging and Non-merging Credit Cooperatives before and after Merger by Discriminant Analysis

(I) Merging Credit Cooperatives				(II) Non-merging Credit Cooperatives			
Predicted	Before	After	Total	Predicted	Before	After	Total
Actual	Merger	Merger		Actual	Merger	Merger	
Before Merger	51	4	55	Before Merger	49	5	54
After Merger	12	43	55	After Merger	6	49	55
Total	63	47	110	Total	55	54	109
Accuracy = 85.45%				Accuracy = 89.91%			
(III) Before Merger				(IV) After Merger			
Predicted	Merging	Nonmerging	Total	Predicted	Merging	Nonmerging	Total
Actual	C.C.	C.C.		Actual	C.C.	C.C.	
Merging C.C.	47	8	55	Merging C.C.	51	4	55
Non-merging C.C.	16	38	54	Non-merging C.C.	12	43	55
Total	63	46	109	Total	63	47	110
Accuracy = 77.98%				Accuracy = 85.45%			
(V) Overall Comparison							
Predicted	Merging	Nonmerging	Total				
Actual	C.C.	C.C.					
Merging C.C.	97	13	110				
Nonmerging C.C.	34	75	109				
Total	131	88	219				
Accuracy = 78.54%							



The means of (3) yield on loan and (14) loan-deposit ratio have statistically significant differences between merging and non-merging cooperatives only before mergers and not after mergers, with higher values for merging cooperatives than for non-merging cooperatives.

This indicates that merging cooperatives lost their superiority in these ratios after mergers, meaning the negative effects of mergers.

On the contrary, there are five ratios which have statistically significant differences only after mergers and not before mergers, namely, (1) yield of interest received, (11) total assets cost ratio, (12) gross earnings margin to total assets, (15) ratio of current expense to current income and (16) income ratio after tax. As far as two of these ratios are concerned, such as (11) total assets cost ratio and (15) ratio of current expense to current income, their means have become higher statistically for merging credit cooperatives, and as far as two more ratios are concerned, such as (12) gross earnings margin to total assets and (16) income ratio after tax, they became more profitable for non-merging cooperatives; all of which exhibits the negative effects of mergers. Only (1) yield of interest received from other financial institution improved for merging cooperatives after merger, showing a positive effect of mergers.

Column (V) of Table 1 shows a general comparison between merging and non-merging credit cooperatives ignoring the year of merger. Those ratios with statistically significant differences between means are (1) yield of interest received, (3) yield on loan, and (14) loan-deposit ratio with positive effect on merging cooperatives, (4) expense ratio, (5) personnel expenses ratio, (8) deposit-cost ratio, (11) total assets cost ratio, (15) ratio of current expense to current income, (16) income ratio after tax, (17) deposit per office, and (18) deposit per full-time officer and employee all of which have superior values for non-merging cooperatives.

There are eleven financial ratios with statistically significant differences between their standard deviations for merging and non-merging cooperatives, ten of which show higher values for non-merging cooperatives compared with those of merging cooperatives, indicating the higher stability of ratios to merging cooperatives.

Nineteen financial ratios were used to compare the financial characteristics between merging and non-merging credit cooperatives by discriminant analysis.

Table 2 shows the classification and accuracies of discriminant analysis. In Table 2-(I), the number of those merging cooperatives with actual data for before merger took place is predicted correctly as before merger in 51 cases, and is predicted incorrectly as after merger in 4 cases, totalling 55 cases.

The sum of diagonal elements,  $51 + 43 = 94$ , represents the total number of correctly discriminated cases which, when divided by the total number of cases 110, yields an accuracy of 85.45%.

The discrimination of non-merging cooperatives before and after the year of merger of merging credit cooperatives, provides an accuracy of 89.91% as shown in Table 2-(II). The difference between these accuracies indicates the existence of the reverse effects of mergers.

Table 2-(III) and (IV) display the comparison of merging and non-merging credit cooperatives before and after merger. The accuracies are 77.98% and 85.45% for those cases before merger and after merger, respectively, the difference of which means the existence of the effects of merger, too. These effects lead to the differentiation of the financial characteristics between merging and non-merging cooperatives.

An overall comparison between merging and non-merging credit cooperatives is given in Table 2-(V). The discrimination accuracy is 78.54%, which is higher than that of the discrimination between merging and non-merging cooperatives before mergers but lower than that of discrimination after merger. By contrast, the accuracy of the overall comparison of credit cooperatives before and after merger is 84.47%, which is lower than those for merging cooperatives before and after merger (85.45%), and of non-merging cooperatives (89.91%).

#### IV ANALYSIS BY THE RELATIVE FINANCIAL RATIOS

The relative financial ratios' are compiled from the differences in absolute financial ratios between merging and non-merging credit cooperatives to eliminate the influence of general economic performance as follows:

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

$d_{ijk}$  : relative financial ratio  $k$  ( $k = 1, \dots, 19$ ) of  $i$  ( $i = 1, \dots, 11$ ) credit cooperative at the  $j$ th ( $j = 1969, \dots, 1987$ ) year

$M_{ijk}$  : financial ratio  $k$  of  $i$  merging credit cooperative at the  $j$ th year.

$N_{ijk}$  : corresponding financial ratio  $k$  of  $i$  non-merging credit cooperative at the  $j$ th year

Table 3 exhibits the comparison of these relative financial ratios before and after merger.

For one year before and one year after merger, there are no significant differences on their means and standard deviations.

For two years before and two years after merger, (2) yield of interest paid has a significant difference in its standard deviations with the values, 0.79% vs. 0.48% for before and after merger, respectively. This trend does not change even from three years to eleven years before and after merger.

For three years before and three years after mergers, (7) tax ratio has significant differences for the three year and eleven year comparison on its standard deviations with higher or equal values before merger compared with after merger for all years.

For the four year comparison, (4) expense ratio and (9) gross earnings margin of deposit to loan have statistically significant differences in their standard deviations. However these significant differences are observed only in the ten and eleven year comparison besides this year. The (12) gross earnings margin to total assets has a statistically significant difference on its means with 0.06% and -0.20% for before and after merger, respectively, indicating the negative effect of merger. Just the same trend with significance can be observed from six to eleven years before and after merger except for three five year comparison, showing the clearly negative effects of mergers. (13) Net equity ratio has a statistically significant difference for its standard deviations from four to eleven years before and after merger with higher values for before merger.

For the five year comparison, (5) personnel expenses ratio, (6) non-personnel expenses ratio, (10) yield on total assets and (11) total assets cost ratio have statistically significant differences on their standard deviations, the latter three ratios of which have statistical differences from five to eleven years before and after merger with higher value for before mergers.

The comparison of six years before and six years after merger has seven ratios added, (1) yield of interest received, (3) yield on loan, (8) deposit-cost ratio, (15) ratio of current expense to current income, (17) deposit per office, (18) deposit per full-time officer and employee and (19) deposit per cooperative's member, which have significant differences



Table 3 Comparison of the Relative Financial Ratios before and after Merger by Year

Financial ratios	One Year		Two Years		Three Years		Four Years		Five Years		Six Years		Seven Years	
	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger
(1) Yield of interest received	0.14 1.43	0.39 2.00	0.19 1.40	0.34 1.67	0.37 1.48	0.54 1.56	0.32 1.48	0.38 1.46	0.44 1.65	0.52 1.35	0.57 1.93	0.58 1.34	0.75 2.15	0.53 1.31
(2) Yield of interest paid	0.02 0.75	0.06 0.47	0.02 0.79	0.05 0.48	0.07 0.79	0.10 0.47	0.12 0.78	0.13 0.46	0.19 0.86	0.15 0.46	0.33 1.10	0.18 0.48	0.41 1.18	0.20 0.49
(3) Yield on loan	0.44 0.92	0.21 0.91	0.33 1.04	0.16 0.92	0.26 0.97	0.09 0.97	0.32 0.98	0.28 1.23	0.52 1.51	0.28 1.16	0.79 2.16	0.28 1.11	0.96 2.42	0.31 1.11
(4) Expense ratio	0.33 0.79	0.42 0.78	0.30 0.69	0.35 0.77	0.33 0.61	0.37 0.76	0.31 0.56	0.40 0.80	0.38 0.66	0.42 0.80	0.46 0.81	0.42 0.82	0.52 0.88	0.40 0.84
(5) Personnel expenses ratio	0.33 0.80	0.33 0.78	0.34 0.71	0.31 0.79	0.37 0.64	0.32 0.77	0.37 0.60	0.33 0.80	0.41 0.60	0.34 0.80	0.48 0.67	0.34 0.81	0.52 0.69	0.32 0.82
(6) Nonpersonnel expenses ratio	-0.04 0.29	0.03 0.25	-0.05 0.28	0.02 0.25	-0.05 0.26	0.02 0.22	-0.06 0.26	0.04 0.21	-0.05 0.31	0.05 0.20	-0.04 0.35	0.05 0.18	-0.03 0.36	0.06 0.18
(7) Tax ratio	0.04 0.10	0.05 0.06	0.01 0.10	0.02 0.07	0.10 0.10	0.02 0.07	-0.00 0.10	0.03 0.10	0.02 0.12	0.03 0.10	0.02 0.12	0.02 0.11	0.03 0.12	0.02 0.12
(8) Deposit-cost ratio	0.35 1.24	0.48 0.86	0.32 1.14	0.43 0.89	0.40 1.05	0.47 0.92	0.43 0.97	0.54 0.99	0.56 1.21	0.58 1.00	0.80 1.69	0.60 1.04	0.93 1.87	0.61 1.07
(9) Gross earnings margin of deposit to loan	0.09 0.83	-0.27 0.86	0.01 0.77	-0.24 0.77	-0.14 -0.38	0.78 0.86	-0.12 0.81	-0.26 1.30	-0.04 0.91	-0.30 1.20	-0.01 0.97	-0.32 1.16	0.03 1.02	-0.30 1.11
(10) Yield on total assets	0.04 0.98	0.05 0.62	0.03 0.98	0.01 0.66	0.15 0.97	0.11 0.70	0.23 0.97	0.14 0.72	0.38 1.38	0.20 0.71	0.61 1.92	0.27 0.71	0.74 2.14	0.27 0.94
(11) Total assets cost ratio	0.04 1.20	0.27 0.87	0.02 1.07	0.25 0.82	0.12 1.01	0.29 0.85	0.17 0.98	0.33 0.88	0.30 1.26	0.42 0.90	0.50 1.64	0.47 0.91	0.60 1.79	0.49 0.94
(12) Gross earnings margin to total assets	-0.00 0.59	-0.22 0.41	0.01 0.54	-0.24 0.49	0.03 0.47	-0.18 0.50	0.06 0.46	-0.20 0.52	0.08 0.47	-0.22 0.56	0.11 0.53	-0.21 0.54	0.14 0.57	-0.22 0.53
(13) Net equity ratio	-0.01 0.05	-0.01 0.04	-0.01 0.05	-0.01 0.04	-0.01 0.05	-0.01 0.04	-0.01 0.06	-0.01 0.04	-0.02 0.06	-0.01 0.04	-0.02 0.07	-0.01 0.04	-0.02 0.09	0.00 0.04
(14) Loan-deposit ratio	3.83 17.87	3.20 17.62	5.40 16.67	1.87 18.29	5.79 16.50	3.49 18.59	5.24 16.24	4.05 19.38	6.39 19.19	4.55 19.65	6.86 21.51	4.57 19.85	6.77 22.27	3.98 20.04
(15) Ratio of current expense to current income	0.60 8.04	3.21 5.78	0.20 7.28	3.24 6.68	0.03 6.32	2.72 6.99	-0.14 6.02	3.16 7.39	1.45 12.37	3.59 7.90	3.93 17.83	5.65 7.69	5.64 20.66	3.73 7.69
(16) Income ratio after tax	-0.31 6.63	-3.26 6.69	-0.85 7.48	-3.50 6.54	-0.78 6.75	-3.15 6.11	-0.72 7.05	-3.31 6.53	-0.14 6.68	-2.48 7.14	0.50 7.00	-2.33 6.88	1.27 7.18	-2.70 6.74
(17) Deposit per office	-1703 2460	-2130 2411	-1596 2157	-2101 2363	-1501 1972	-2754 2495	-1400 1800	-2386 2624	-1305 1690	-2457 2697	-1209 1614	-2498 2792	-1105 1551	-2526 2734
(18) Deposit per full-time officer and employ	-753 937	-841 985	-7032 834	-7887 942	-594 937	-857 981	-554 843	-872 1014	-517 783	-936 1059	-4865 251	-9795 1616	-450 723	-963 1176
(19) Deposit per cooperative's member	12 1318	-28 1373	27 1216	-52 1310	11 1261	-129 1390	18 1245	-178 1494	41 1245	-217 1576	55 1250	-314 1613	74 1277	-385 1627

1) a indicates the statistically significant difference at the 5% level; b at the 1% level; c at the 0.1% level.  
 2) A unit of (1)-(16) is ¥, (17) million Yen, (18) ten thousands Yen, (19) thousand Yen.  
 3) First row of figures = means, second row of figures = standard deviations.

Table 3 continued

	Eight Years		Nine Years		Ten Years		Eleven Years	
	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger	Before Merger	After Merger
(1)	0.69 2.15	0.50 1.28	0.74 2.15	0.48 1.25	0.73 2.09	0.45 1.26	0.70 2.16	0.42 1.25
(2)	0.38 1.15	0.23 0.49	0.38 1.13	0.24 0.50	0.37 1.11	0.24 0.49	0.40 1.18	0.24 0.49
(3)	0.90 2.32	0.32 1.11	0.90 2.25	0.29 1.09	0.83 2.22	0.29 1.08	0.86 2.41	0.28 1.06
(4)	0.44 0.86	0.40 0.85	0.43 0.86	0.39 0.85	0.55 1.67	0.38 0.85	0.55 1.68	0.37 0.86
(5)	0.50 0.66	0.32 0.83	0.48 0.65	0.30 0.83	0.62 1.62	0.29 0.83	0.62 1.60	0.29 0.83
(6)	-0.07 0.38	0.07 0.17	-0.08 0.40	0.07 0.17	-0.10 0.62	0.07 0.17	-0.10 0.43	0.07 0.16
(7)	0.03 0.12	0.02 0.11	0.03 0.12	0.02 0.11	0.03 0.13	0.02 0.11	0.03 0.14	0.02 0.11
(8)	0.84 1.81	0.63 1.09	0.81 1.77	0.62 1.09	0.92 2.14	0.62 1.08	0.95 2.24	0.61 1.08
(9)	0.07 1.02	-0.31 1.10	0.09 1.01	-0.33 1.10	-0.09 1.76	-0.33 1.09	-0.09 1.76	-0.33 1.07
(10)	0.65 2.07	0.27 0.75	0.69 2.16	0.25 0.78	0.66 2.13	0.25 0.75	0.63 2.33	0.23 0.75
(11)	0.51 1.75	0.50 0.95	0.53 1.82	0.49 0.98	0.49 1.80	0.49 0.98	0.52 1.93	0.47 0.99
(12)	0.14 0.57	-0.23 0.53	0.16 0.58	-0.24 0.55	0.16 0.57	-0.24 0.55	0.11 0.75	-0.25 0.57
(13)	-0.02 0.10	-0.00 0.04	-0.03 0.11	-0.00 0.03	-0.03 0.12	-0.00 0.03	-0.04 0.14	-0.00 0.03
(14)	6.45 21.54	4.11 20.01	6.41 20.89	4.06 20.13	6.02 21.03	4.11 20.39	6.21 22.21	4.15 20.51
(15)	4.82 19.88	3.87 7.70	5.18 20.75	4.07 8.02	4.73 20.18	4.10 8.11	7.04 26.66	4.14 8.42
(16)	1.93 8.19	-2.17 6.60	2.81 10.81	-2.23 6.58	-5.83 85.42	-2.27 6.52	-5.96 83.34	-2.24 6.45
(17)	-1057 1483	-2584 3068	-1000 1431	-2528 3062	-971 1392	-2491 3087	-935 1367	-2453 3112
(18)	-430 691	-979 1226	-411 668	-958 1228	-400 651	-938 1238	-387 641	-921 1254
(19)	84 1200	-418 1640	100 1167	-425 1644	110 1138	-422 1638	119 1118	-416 1634

on their standard deviations. The former four ratios have higher values before merger than after merger, indicating the stabilizing effects of mergers.

The latter three ratios have higher values after merger, showing the destabilizing effects of mergers on productivity-related ratios, except for the nine years before and after mergers of (18) ratio.

For statistically significant differences on their means from six to eleven years, (12) gross earnings margin to total assets and (16) income ratio after tax are reported to have higher values before merger than after merger, indicating the negative effects of mergers. After seven years before and after merger, almost the same trend can be observed among the 19 financial ratios.

Therefore, by using relative financial ratios, we could conclude that mergers have negative effects on the profitability of credit cooperatives.

### V CONCLUSION

As the conclusion of this article, we could find the facts that the effect of mergers on the performance of credit cooperatives is negative. However mergers could have the effect of stabilizing financial ratios. Secondly, generally speaking, merging credit cooperatives show rather inferior financial characteristics to non-merging cooperatives. Those results are consistent with the previous study conducted by Hoshino<sup>5)</sup>

However, the credit cooperatives regard it as a necessity to achieve tie-ups and mergers based upon their own judgement in order to pursue the economy of scale, especially when they have enough financial strength in reserve.<sup>6)</sup>



Nihon Keizai Shinbun Inc. [19] conducted a questionnaire survey among chairmen of credit associations. 300 out of 455 credit associations replied, 47.7% of which mentioned the necessity of mergers among credit associations, and 21.7% of which answered no change in the future.

As to the objectives of firms in Japan, the Ministry of International Trade and Industry (MITI) revealed the result of their investigation, showing that the first is to maximize profit (45.0%), which showed a big difference with the study conducted ten years ago, which said that maximizing sales was the most important. Following these objectives are the strengthening of technology, diversification of management, internationalization of business, maximization of sales and market share. Among these five objectives of firms, the diversification of management and the internationalization of business have a close relationship with mergers.

In particular, Japanese corporations are quite willing to buy foreign companies, which is called the "in-out" type of merger, rather than the "in-in" type. This is because, they would like to 1) save time, 2) obtain a group of personnel, 3) economize on the amount of investment, and 4) gain the benefits of synergy.

596 out of 917 firms (65.5%) that responded to the questionnaires' survey conducted by Nihon Keizai Shinbunsha [20] in 1988 have an interest in M&A and 601 firms admit the necessity of mergers for reasons of business diversification (62.1%), the acquisition of new technology (53.1%) and the acquisition of specific assets (15.5%).

In this article, accounting data are used to measure the performance of mergers, because a credit cooperative is not a stock listed corporation. When it comes to analyzing listed corporations, to extend our analysis, capital asset pricing theory" becomes useful for measuring performance by calculating the cumulative average excess return.

#### NOTES

1. See Kinyu Zaisei Jijyo Kenkyukai [17].

2. Kinyuseido Chosakai Kinyuseido Daiichi Iinkai (The First Committee on the Financial System, Investigative Organ of the Financial System) published a report entitled *Kyodo Sosiki Kinyukikan no Arikata ni tsuite* -- Kinyuseido Daiichi Iinkai Chukan Hokoku (The 'Ought to be' of Cooperative Financial Institutions - An Interim Report of the First Committee on the Financial System).

Mergers and conversions are included in chapter 5 of this report and in section 1 as follows. It is important for cooperative financial institutions to strengthen their management basis and to obtain the competitive power necessary to cope with the progress of financial liberalization etc. In this case, the self-helping endeavors of individual cooperative financial institutions are important. In addition, it is a useful method of utilizing mergers, tie-ups and alliances between organizations. In the case of cooperative financial institutions, considering their increase in size in order to strengthen their management basis because of their previous small size, mergers are expected to be conducted with a forward-looking attitude.

As for the administrative side, it is necessary to pay attention to promoting the appropriate mergers with enough consideration for the self-governing aspect of cooperative financial institutions.

The First Committee points out five important items to be observed.

3. There are several mergers among more than two credit cooperatives at the same time for the period 1975 to 1981 as follows.

- 1976 Fukuokashi Syoko, Iizuka Syoko, Shimen -- Fukuokaken, February.
- 1980 Yoshii (Merged by Fuhi and Amaki in 1970) -- Ryochiku, April; Higashi Kurume, Yanagawa

Sanwa, Chikuhō -- Fukuokaken Nanbu, April;  
Hakozaki, Kashii, Nishima -- Higashi Fukuoka  
(Consolidation, October)

• 1981 Nagasaki Sogo, Isahaya, Dai Nagasaki,  
Tsushima -- Nagasaki Daiichi (Consolidation April)

4. The relative financial ratio is defined and compiled to measure the performance of mergers for the first time in English literature in Hoshino [11].

5. A series of studies is given in Hoshino [2, 3, 4, 6, 8, 9, 10, 11] and the survey of studies of mergers in Japan could be referred to in Hoshino [7].

The latest study by Odagiri and Hase [25] reported that they could not find any positive effects of mergers and acquisitions, and could not support the theory that horizontal mergers and acquisitions improve efficiency and increase the wealth of stockholders.

6. Ryutaro Kasahara, the Chairman of Zenkoku Shinyo Kumiai Kyokai (National Association of Credit Cooperatives) expressed his opinion at the Annual Convention of the Association on June 2, 1988. Nihon Kinyu Tsushin Sha [22].

7. There are four studies using Capital Asset Pricing Theory and the stock prices of Japanese corporations to test the performance of mergers. Sudo [31] concluded that mergers have negative effects on a firm's valuation by calculating the monthly cumulative residuals. Sakakibara [27, 28] could not expect synergy's effects on corporate mergers. Pettway and Yamada [26] described the increase in the wealth of stockholders of acquiring firms without statistical significance and the positive effect of the announcement of the increased wealth of the stockholders of acquired firms. Ito [13] mentioned that mergers decrease the valuation of both acquiring and acquired firms.



Appendix I  
Financial Ratios Analyzed

- 1 Yield of interest received = interest received/deposit×100
- 2 Yield of interest paid = interest paid/deposit×100
- 3 Yield on loan = interest on loan/loans×100
- 4 Expense ratio = (personnel expenses + nonpersonnel expenses + tax)/deposit×100
- 5 Personnel expenses ratio = personnel expenses/deposit×100
- 6 Nonpersonnel expenses ratio = nonpersonnel expenses/deposit×100
- 7 Tax ratio = tax/deposit×100
- 8 Deposit-cost ratio = interest paid on deposit + expense ratio
- 9 Gross earnings margin of deposit to loan = interest on loan - cost of deposit ratio
- 10 Yield on total assets = recurring profit/total assets×100
- 11 Total assets cost ratio = ordinary expenditure/total assets×100
- 12 Gross earnings margin to total assets = yield on total assets - total assets cost ratio
- 13 Net equity ratio = equity/accounts of members×100
- 14 Loan-deposit ratio = loan/deposit×100
- 15 Ratio of current expense to current income = current expense/current income
- 16 Income ratio after tax = current income after tax/account of members×100
- 17 Deposit per office = deposit/number of offices
- 18 Deposit per full-time officer and employee = deposit/number of officers and employees
- 19 Deposit per cooperative's member = deposit/number of members of cooperative

Appendix II  
A List of Merging and Non-merging Credit Cooperatives

Prefecture	Period of Merger	Merging Credit Cooperatives	Name after Merger	Non-merging Credit Cooperatives
Tokyo	10/1/81	Daiichi Kangyo Hōsei	Daiichi Kangyo (Nippon Kangyo till 1970)	Chogin Tokyo (Douwa till 1971)
Tokyo	10/1/78	Keihin Meiwa	Kyoritsu	Nakanogou
Tokyo	4/1/74	Tokyo-Seinan Miyoshi	Seinan*	Katsushika-Shōkou
Osaka	4/1/74	Osaka Minami Hirano	Seikyo	Osakafu-Ishi
Hyogo	4/1/82	Seika Kobe Chūō	Minato	Hyogoken Keisatsu (Hyogoken Keisatsu Shokuin till 1973)
Nara	3/1/81	Naraken Naraken Tobacco	Naraken	Nara Chōgin
Fukuoka	12/1/79	Minami Fukuoka Futsukaichi	Fukuoka Minami	Fukuokaken-Ishi
Saga	10/1/75	Fujitsu Ariake	Saganishi	Matsuura
Saga	10/1/78	Kanzaki Kojiro	Sagahigashi	Sagaken-Ishi
Nagasaki	8/1/81	Saseho Ōmura	Nagasaki-Kenmin	Nagasaki-Mitsubishi
Miyazaki	10/1/80	Takachiho Hikage	Miyazakiken-Hokubu	Hyugashi

\* Seinan Cooperative merged with Sōei Cooperative on February 1, 1988.



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