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Abstract	By the above-explained examination the result is that the property of economies of scale is hardly recognizable in Japan's life insurance business. This differs from the results Johnson obtained for Britain and Houston for America. So we should like to refer to this diversity as the conclusion of this report. As the cause for such diverse results, firstly differences in method are conceivable. On this point we must admit some lack of strictness on our side compared with the foreign studies, as mentioned already. Secondly, since diversity of business scale is smaller in Japan than in foreign countries, a possibility is that economies of scale, if actually working, might have been dissolved into a sector of the cost curve (straight-line sector). Lastly, by our former study of the same theme for nonlife insurance the property of economies of scale was realized. Then, if the scale-cost relation differs between life and nonlife in the same country of Japan, possibly the reason lies in the institutional particularity of life insurance business. And if so, the biggest factor may be ascribable to the system of policy sale. Nonlife employs a system of agent while life that of fieldman. This system, may possibly affects costs, and hence on the scale-cost relation. Final conclusions on the result of this study should wait solution of these problematic points.
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SCALES AND COSTS IN JAPAN'S LIFE INSURANCE BUSINESS

by

Yutaka Maekawa

1. Foreword

When in 1969 the Insurance Council discussed future proper lines of government's policy on insurance to cope with the liberalization of this industry foreseen, it was pointed out that willingness of enterprises toward efficient management and hence the development of this business had been impaired by the long-continued framework of coordination with attendant contradictions and distortions, and that introduction of competition principle should be urged to promote efficiency.¹⁾ This problem of managerial efficiency arouses our interest in the structure of the insurance market of Japan. So we wish to attempt an approach from the viewpoint of the theory of industrial organization, an applied form of economics or price theory. Our scope in this report, however, will be confined to the factor of economies of scale from among various determinants of market structures.

Up to date many positive studies in economies of scale, now a wide-accepted concept, have been conducted on various industries. Yet as regards insurance business such work appears meager in Japan contrastively to the pioneering studies in foreign countries.²⁾

1) Reply report of Hoken Shingikai, *Kongo no Hokengyōsei no Arikata*.

2) Positive studies in economies of scale in insurance business are shown in detail in the articles of Howston and Simon, which we arrange as follows with some additions. Johnston, J. and G. W. Murphey, "The Growth of Life Insurance in the U.K. since 1880," *Manchester School of Economics and Social Sciences*, Vol. 25 (May 1957). Johnston, J., *Statistical Cost Analysis*, 1960, Roy J. Henseley, "Economies of Scale in Financial Enterprises," *Journal of Political Economy*, LXCL (Oct. 1958). Ditto, *Competition, Regulation, and the Public Interest in Nonlife Insurance*, 1962. David B. Houston and Richard M. Simon, "Economies of Scale in Financial Institutions; A Study in Life Insurance," *Econometrica*, Vol. 38, No. 6 (Nov. 1970) J. D. Hammond, et al., "Economies of Scale in the Property and Liability Insurance Industry," *Journal of Risk and Insurance*, Vol. XXXV, No. 2 (June 1971). G. Clayton, *British Insurance*, 1971.

As formerly we have discussed economies of scale in nonlife insurance, here life insurance is taken up as object.

Thus, this paper is intended to analyze positively the relation between scales and costs, which makes one of the features of market structures in general, in order to realize the life insurance market of Japan.

2. Life Insurance as An Industry

Life insurance, object of our analysis, is distinguished from nonlife insurance. This distinction, though generally accepted, is not wholly innocent of questions.³⁾ Yet it may be acknowledged to treat two businesses separately, and hence life insurance as an industry, at least for the prohibition of combined management of the two by the Insurance Business Law of Japan, and if we allow Joe S. Bain's definition of industry, that is, a collective body of closely alternative goods.⁴⁾

Since several years ago the number of Japan's life insurance enterprises has been limited to twenty, partially following government's policy. One of the reasons for the intensifying differentials of scale and the worsening efficiency may be found in this constrictive framework. So, before going into the theme of economies of scale, we shall take a glance at the level of market concentration, another determinant of market structures. Table 1 presents market shares for 1971. It is seen that upper-rank four of the twenty companies make up 54 per cent of the market and eight, less than a half, 80 per cent. This tells apparent differentials between large-share companies and small-share companies. Such differentials of share are just those of scale, whose relation with costs is to be studied.

Table 1. Concentration in Life Insurance Market

Companies (top to lower)	Share (cumulative, %)
1	21
2	35
4	54
8	80

3. Data

To examine the scale-cost relation in life insurance, a problem arises of what should be taken as the variables of scales and costs. It is considered a

3) This is obvious in view of the fact that some sorts of insurance pertain to both life and nonlife, and the recent inclination toward term life insurance, longer term of nonlife, and multiple-line-insurance.

4) Japanese version by K. Miyazawa, *Sangyō Soshikiron*, 1970, p. 7.

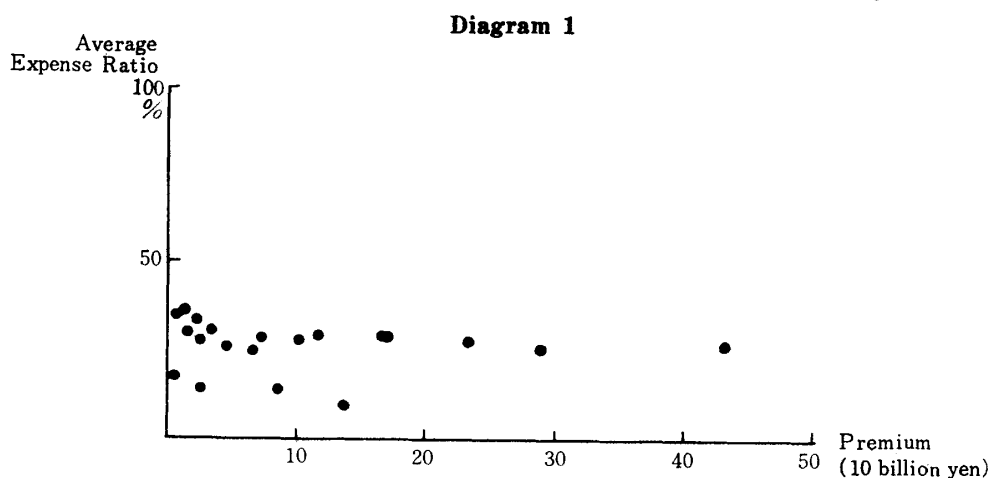
difficult matter, speaking generally, to select an item appropriate to represent output of the service sector, to which insurance makes no exception. Usually for the output of insurance business the amounts of ① new business, ② premium and ③ policies in force are conceived.⁵⁾ New business and premium imply a flow concept, while policies in force a stock concept. That is to say, new business shows its amount for the current year, most clearly reflecting present positions. Policies in force denotes the amount existing at the end of the current year, telling performances from past to present. And premium means premium incomes for the year of both new business and policies in force. No definite criterion exists as to which of these three should be used for output. Hence maybe it is necessary to adapt all of them. Yet this report takes premium because here analysis on cross-section data is intended, while in our former study in nonlife insurance time-series data were used.⁶⁾

Premiums of life insurance consist of net premium and loading, as is well known. Accordingly costs are divided into the amount of insurance (costs of loss) and expenses. Expenses involve acquisition cost, expenses of collection, administrative expenses and so on. Here costs denote such expenses.

The values to be observed of premiums (as output) and expenses (as costs) are available from three representative publications of insurance statistics: the *Hoken Nenkan* by Ōkura Zaimu Kyōkai, *Seimei-hokenjigyō Gaikan* by Seimeihoken Kyōkai and Special Statistical Issue of the *Insurance* by Hoken Kenkyūjo. We relied on the *Seimeihoken Jigyō Gaikan* (Summary of Life Insurance Business), 1971 edition.

4. Scales and Costs

Firstly the relation between scales and average cost-rates is shown in Diagram 1. As is seen, putting aside four companies with a relatively low average



- 5) Roy J. Hensley, *op. cit.*, p. 390. Hensley mentioned this referring to nonlife but the matter may be the same for life insurance business, too.
- 6) David B. Houston and Richard M. Simon, *op. cit.*, p. 856. It is devised to eliminate increases in premium incomes due to rises in rates, not to growth of output.

expense ratio, we can specify a cost function of rightward-down slope (though minute). The reason for the low ratio of four companies is uncertain.

Table 2 exhibits the relation by scale. As may be obvious by the table, it is impossible to speak of the relation with any definiteness. Insofar as Table 2 is concerned, it appears rather that larger-scale companies have higher expense ratio while smaller-scale ones lower ratio.

Table 2. Business Scales and Expense Ratio

Premium (1000 yen)	Companies	Average Expense Ratio (%)
3,000,000,000 and above	1	29
2,500,000,000~2,999,999,999	1	27
2,000,000,000~2,499,999,999	1	29
1,500,000,000~1,999,999,999	2	30
1,000,000,000~1,499,999,999	3	22
50,000,000~ 999,999,999	3	22
1,000,000~ 50,000,000	9 (4)*	27

* (4) shows joint-stock companies among 9.

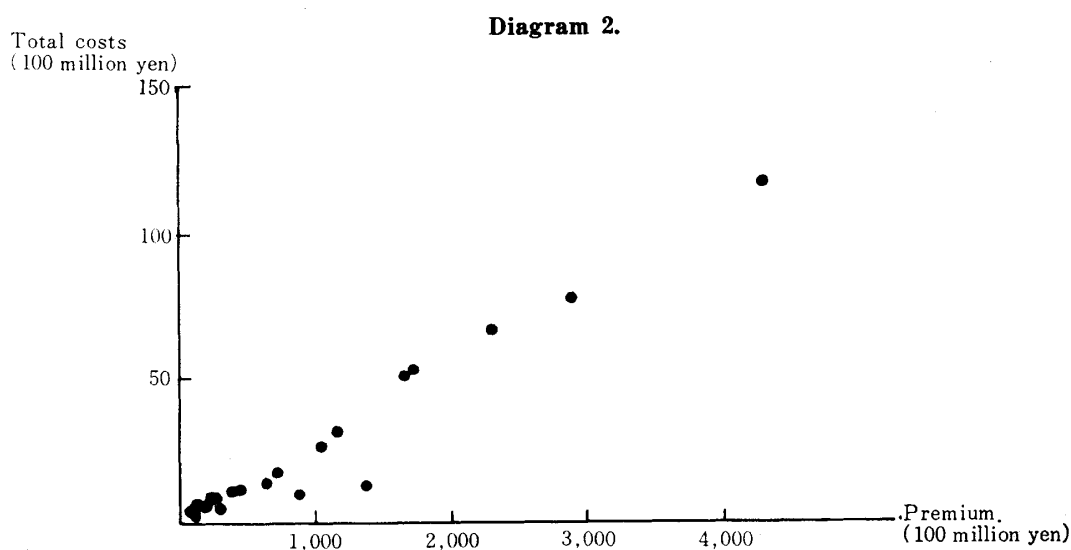
Next we put econometric analysis on total costs. The correlation between scales and total costs is shown in Diagram 2. And the cost function, taking total costs as the function of output, may be conceived as:⁷⁾

$$\log Y = \log a + b \log X.$$

As the least square regression of this expression we had:

$$\log Y = -1.268 + 0.9924 \log X \quad R=0.958.$$

(1.259) (0.070)



7) Houston and Simon, *op. cit.*, p. 856. Houston and Simon contrived three average cost functions, on each of which they had results.

In view of this correlation coefficient of 0.958, fitness of the equation may be said good. And by comparing the estimate of regression coefficient b with the standard error in brackets, it may be appreciated that the result of measurement is statistically significant. Then, with the value of b being 0.9924, the property of economies of scale cannot be spoken of. Rather the hypothesis of constant returns may apply.

Here some reexamination of this result may be necessary. It concerns with the method of analysis, in other words, whether the scale-cost function was purely observed or not. For this problem, Johnston took account of new business and group insurance, and removed the effects of these factors by introducing a variable of new business and by dividing group insurance by types of policies.⁸⁾ Again Houston and Simon considered product mix, growth rates, surrender ratio and enterprise forms, for which variables were used respectively in order to keep comparability.⁹⁾ To adapt these considerations to the case of Japan, an immediate difficulty lies in the availability of data. And if, for instance, data are available of enterprise types, observation dividing that small number of enterprises into sixteen mutual-insurance companies and four joint-stock companies will only mean a further decrease in the number of sample, which might affect statistical reliability. As regards enterprise types, however, by a popular view there lies little difference between the said two systems. Yet no definite appreciation will be permitted as regards other factors.

5. Summary

By the above-explained examination the result is that the property of economies of scale is hardly recognizable in Japan's life insurance business. This differs from the results Johnson obtained for Britain and Houston for America. So we should like to refer to this diversity as the conclusion of this report.

As the cause for such diverse results, firstly differences in method are conceivable. On this point we must admit some lack of strictness on our side compared with the foreign studies, as mentioned already.

Secondly, since diversity of business scale is smaller in Japan than in foreign countries, a possibility is that economies of scale, if actually working, might have been dissolved into a sector of the cost curve (straight-line sector).

Lastly, by our former study of the same theme for nonlife insurance the property of economies of scale was realized. Then, if the scale-cost relation differs between life and nonlife in the same country of Japan, possibly the reason lies in the institutional particularity of life insurance business. And if so, the biggest factor may be ascribable to the system of policy sale. Nonlife employs a system

8) Johnston, J., *op. cit.*, p. 107.

9) Houston and Simon, *op. cit.*, pp. 857-858.

10) No connection exists between the four joint-stock companies mentioned here and the four companies with dispersion appearing in Diagram 1.

of agent while life that of fieldman. This system may possibly affects costs, and hence on the scale-cost relation.

Final conclusions on the result of this study should wait solution of these problematic points.

This report owes much to the suggestions given by Professors Shigeru Tamura and Shunsaku Nishikawa and Associate Professor Masahiro Kuroda. Of course the writer is responsible for all.