THE STRUCTURE AND PRICING OF SAVINGS-TYPE POLICIES IN JAPAN

by

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and

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BIOGRAPHIES:

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ABSTRACT:

Savings-type policies are one of the most popular non-life insurance products in Japan, but virtually unknown in other countries. They are long-term policies where the premium includes a substantial deposit in addition to the pure insurance premium; at maturity, if there have been no major losses, the deposit is refunded, with interest and dividends.

In this paper, we describe the development and basic structure of savings-type policies in Japan. We also show how the premium and reserves are calculated. We compare these policies to products available in the U.S. market, such as endowment life insurance and retrospective rating plans. Finally, we discuss the prospects for this type of policy in Japan and in the U.S.

THE STRUCTURE AND PRICING OF SAVINGS-TYPE POLICIES IN JAPAN

I. OVERVIEW

This paper describes the development and pricing of the savings-type policies in Japan. These can be described as long-term personal insurance products that have a built in savings function.

At present the sales of this type of policy are still very limited on a worldwide basis. Other than in Japan, they are sold in any quantity only in Korea and Taiwan, and are not much known in the rest of the world. In Japan these policies were created almost twenty-five years ago, and have grown well since then.

As we believe that the savings-type policy can be universally useful and effective for the development of the non-life insurance industry, we are pleased that many people throughout the world are now interested in and paying attention to these policies. This paper is intended as an introduction to these products. In the next section, we review the background to the creation of these products and the history of their development to date. Then we cover the essential features; in other words, what are savings-type policies? The next section presents the basic structure and pricing of these policies. To help explain the concepts, we make comparisons to existing U.S. products. Finally, we discuss the future prospects for this type of product in Japan and in the United States.

II. DEVELOPMENT

In this section we will give a short history of the development of savings-type policies in Japan, and we will discuss some of the reasons for their enormous growth there.

Brief History of Savings-Type Policies in Japan

As shown in Exhibit 1, fire mutual and building endowment insurance were first licensed in 1963, in compliance with the suggestion of the Japanese Insurance Council. The Council is an advisory organization to the Ministry of Finance, which regulates insurers in Japan. It recommended to the insurance industry the development of new types of insurance, such as policies that promised a refund to policyholders if the policy expired without any major losses.

As you know, insureds under fire policies pay their insurance premium to the insurance company, and only the person who suffers a loss can recover the claim amount. This is quite natural to those of us in the non-life insurance business, but as you can imagine, many policyholders feel that they have wasted their insurance premium when their policies expire without any claim.

To satisfy these discontented people by refunding some amount when the policy expires without any major losses, and also to popularize non-life insurance in Japan were the main purposes in developing the savings-type policy.

Thus, the first two kinds of savings-type policies were introduced in 1963. However, they could not produce a great impact on the insurance market because they were licensed and sold only by two small companies.

Since then, long-term comprehensive policies for dwellings and long-term family traffic personal accident policies with maturity refund were introduced in 1968 and 1974 respectively. Both policies were licensed and sold by all insurance companies and have gradually become two of the main insurance policies in the non-life insurance field.

Subsequently, in 1981, the Japanese Insurance Council recommended more diversification of the savings-type policies, and, in compliance with this recommendation, various other savings-type policies have been developed since 1984. Today, each non-life insurance company sells a variety of savings-type policies. The premium volume of "Long-Term Ordinary Personal Accident Insurance with Maturity Refund" is the largest of any branch of this type of insurance.

Enormous Growth of Savings-Type Policies

Exhibit 2 shows the development of premium volume for savings-type and for traditional policies since 1965.

The premium volume for savings-type policies in Japan in the 1989 accounting year (which ended March 31, 1990) reached ¥3,191 billion (U.S. $25 billion[1]) and the share of this business became 37.1% of the whole premium income of ¥8,596 billion (U.S. $66 billion). It was only 0.6% in 1965 and 8.0% in 1975.

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[1] The exchange rate used throughout this paper is ¥130 = US $1.

The average growth rate of savings-type insurance premiums in the past 14 years, from 1975 to 1989, has been 23.6% annually. This far exceeds the 7.8% growth rate of traditional products for the same period.

As a result, the assets of savings-type policies grew to ¥12,307 billion (U.S. $95 billion) at the end of 1988. This is 51.8% of the total assets of ¥23,767 billion (U.S. $183 billion) as shown in Exhibit 3.

So, the market share of savings-type policies has increased enormously during this short period. How can we explain this huge growth? It is popular to say that this type of insurance has appealed to the Japanese people's propensity to save and has proved immensely popular as a result. However, this is not the only reason. A mixture of the following four factors is probably responsible and form the background to this enormous growth:

1. The first reason is that the accumulation of personal financial assets has increased substantially because of the increase in personal income following Japanese economic development. This is the main reason for the current development of financial industries (banking, securities, life and non-life insurance, etc.) but the growth of savings-type policies exceeds the growth of personal assets. Therefore, there must exist other reasons.

2. The second reason is the diversification of savings-type policies. As we explained above, this type of insurance was originally developed to popularize non-life insurance in Japan, and as a result of diversification, products highly weighted for savings have attracted policyholders. There is now a product where the savings portion exceeds 95% of the whole premium.

3. The third reason is that each insurance company has invested its resources and energy in the development and marketing of savings-type insurance. We understand that each company has recognized the importance for the future of the growth of this type of insurance, in addition, of course, to being involved in the severe market share competition in the Japanese market.

4. The sales network of Japanese non-life insurance companies is made up of agents, who vary from professional agents to car dealers, service station owners, etc. These agents approach consumers very positively and effectively to increase their clients. Non-life insurers are eager to use their agents and directly approach the consumers to sell fire and automobile policies. For the sale of savings-type policies, non-life insurance companies made the maximum use of their existing agency networks, and the agents visited their clients to solicit the savings-type products. This marketing method turned out to be a very fresh and unique one in the area of savings, because traditionally Japanese banks set up large offices and wait for their customers to come to them.

III. CHARACTERISTICS OF SAVINGS-TYPE POLICIES

Next, we would like to explain the main characteristics of savings-type policies. First we will describe the key features:

1. A maturity refund and possibly a dividend are paid at expiration if there have been no major losses;
2. Policy terms range from 3 years to 5, 10, and even 20 years;
3. There are two loan systems under the policy conditions;

We also will describe the new functions of these products in recent years, and finally something about the tax treatment.

Maturity Refunds and Dividends

The first feature of these products is that there are maturity refunds and dividends to the policyholder as well as the ordinary insurance cover.

The premium of savings-type policies consists of an indemnity portion and a savings portion. The indemnity portion is consumed for the claim costs plus the agent's commission, company expenses, and profit. The savings portion is used to pay a maturity refund to the policyholder at the expiration of the policy. The maturity refund equals the savings portion plus interest at a guaranteed rate (presently 5% annually) to the maturity date.

The savings portion is invested by the insurance company in bonds, stocks, or loans, to get the best yield possible. If the actual yield exceeds the original assumed interest rate, then the insurance company, after deducting investment expenses and an appropriate profit, can pay a policyholder dividend in addition to the maturity refund. In other words, the maturity refund is a minimum guarantee for the policyholder, and the dividend is a bonus depending on the actual investment result.

These maturity refunds and dividends to policyholders are the most attractive characteristics of the savings-type policy because of its savings function. As already mentioned, this has led to huge growth in the sales of these products. The amount of the maturity refund is more or less than the total premium paid by the policyholder depending upon various factors, such as:

- the proportion of the savings portion against the total premium,
- the length of the policy,
- the method of payment (that is, lump sum or installment).

The maturity refund and dividend are paid only if the policy matures without any major losses. The definition of a major loss, and its probability, varies by type of insurance. In general, a major loss means the object insured is lost. For example, for fire insurance a major loss means a serious fire; for personal accident insurance, it means an accidental death or major disability.

If a major loss occurs, the policy terminates at that time. This is in accordance with the Japanese treatment for non-savings-type policies. The savings portion is also voided; otherwise, there would be no difference between a bank deposit and the savings portion.

Long Term of Insurance and Variety of Premium Payment

The second key feature of the savings-type policy is the length of the policy period. Most non-life insurance is written for one year, but the policy terms of savings-type policies range from 3 years to 5 years, 10 years, and even to 20 years.

In accordance with this long period of insurance, there are six methods of premium payment: payment in lump sum, down payment, annual payment, semi-annual payment, monthly payment, and group monthly payment.

Payment in lump sum means that the policyholder pays the total premium for say five or ten years at one time at the inception of the policy. Down payment means that a policyholder pays a part of the total premium at inception, and pays the rest annually or monthly. Semi-annual payment and monthly payment of course require additional premium compared with annual payment, to cover the expense of

the extra billings. However, for group monthly payment, the additional premium is favorably treated in consideration of the efficient collection of premium.

The semi-annual and monthly installments are computed from the annual payment premium by multiplying by a factor. The factor varies according to the method of payment and the part of insurance (i.e., the savings portion or pure insurance portion). For down payment, which is a combination of lump sum and annual or monthly payment, the premium is derived by separately calculating the premium of each portion.

Besides a variety of premium payment plans, we should mention that there are also multiple methods for paying the maturity refund. It used to be paid in full at maturity, but, starting two years ago, it can be paid in installments. This means that savings-type policies also have some pension characteristics.

Loan System for Policyholders

This is the third key feature. Since savings-type policies contain a savings portion, insurers can make loans to policyholders. There are two kinds of loans built into the insurance contract. The first is that if the policyholder does not make a scheduled premium payment (other than the first), the insurer makes an advance against the collateral of the savings portion of the premium. This is called the "premium transfer loan system." By this system the insurance policy is not terminated at once and the policyholder enjoys a longer term of protection.

The second type is the "policyholder loan system," which is a loan made by the insurer for the free use of the policyholder. The amount of the loan is

within a specified range, and again is secured by the savings portion as collateral. By this system a policyholder can borrow money if necessary and retain the policy without canceling it. This makes the investment more liquid and increases the attractiveness of these policies.

Recent Developments

In recent years, Japanese insurers have added various functions to savings-type policies. The following developments have occurred subsequent to the recommendations made by the Japanese Insurance Council in May, 1987, to promote the facilities available to policyholders (Exhibit 4):

1. Installment payment of claims and maturity refunds were introduced in June, 1987, as described above.
2. So-called *Zaikei* insurance was introduced in January, 1988. *Zaikei* is a system, prescribed by a special law and given favorable tax treatment, for working people to accumulate savings. Most financial industries provide this system with their products and non-life insurance companies were admitted to participate in 1987.
3. The down payment system for premium was introduced in June, 1988.
4. In 1989 a special endorsement for mid-term refund payment was introduced and the insurance period was extended to 20 years on the "New Type of Long-Term Ladies Insurance Policy."[2] The endorsement is available for policies with a term of over 10 years. After the first five years, the insured can receive a prescribed mid-term refund on the anniversary date of the policy.

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[2] As the name implies, this policy is specially designed for and only marketed to women. It offers a broad package of coverages including accidental death and disability, personal liability, and damage to personal belongings. In only three years it has become one of the most popular savings-type products.

Tax Treatment in Japan

A Tax Reform Act was approved by the Diet in September, 1987. Interest on all bank deposits became subject to 20% tax starting April 1, 1988, instead of the prior tax-free treatment below a certain amount of deposit (the *Maruyu*).

As regards the maturity refund and policyholder dividend, only those policies that display all the following characteristics will attract the full 20% tax on the amount that exceeds the premium paid:

1. The premium payment method must be lump sum;
2. The policy term must be five years or less; and
3. The amount insured must be less than five times the maturity refund.

Policies which display all three of the above characteristics are regarded as products that are similar to bank deposits and the full 20% tax is charged. The usual savings-type policies that do not display all the above characteristics are taxed only if the total amount of the maturity refund and dividend exceeds the total premium paid by ¥500,000 (U.S. $3,846).

IV. BASIC STRUCTURE

This section will describe the "Basic Clause for Savings-Type Insurance," and present the formulas for calculating the premiums and reserves. Finally, we will present an example of a typical policy.

Basic Clause for Savings-Type Insurance

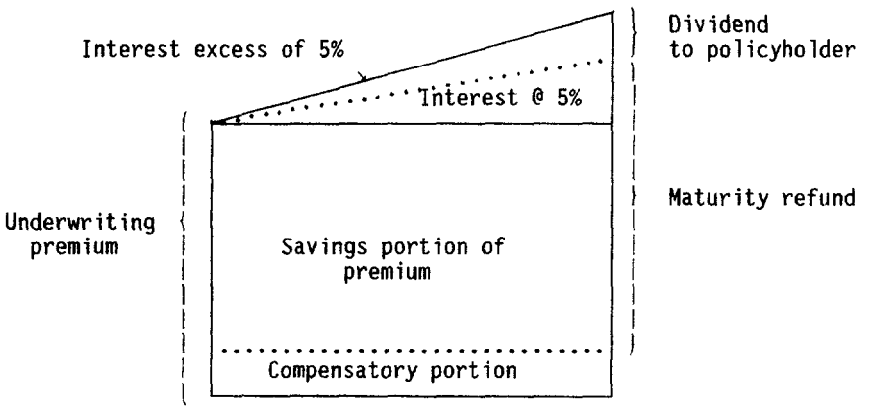
Formerly, conventional savings-type insurance took much time and effort, to develop the clauses, pricing methods, and computer systems. Now, the

development of the "Basic Clause for Savings-Type Insurance" (see Exhibit 5) has made the process much easier.

First, you can easily design a savings-type insurance policy by making the savings portion an independent clause, and then making it incidental to the general terms of ordinary insurance. Second, you can create an insurance package based on the savings-type policy thus made, and add different kinds of insurance to it. That is, you can freely design the indemnity portion.

Pricing

Using the "Basic Clause for Savings-Type Insurance" it is easy to calculate the underwriting premium. The premium of the underlying non-savings-type insurance is calculated in the usual way for the particular kind of insurance. In this section we will present the formulas to calculate the premium for the "Basic Clause for Savings-Type Insurance" (the savings portion plus a small expense load). The underwriting premium is the sum of the two pieces. The following diagram shows the relationship of the various elements:



In the formulas for the premiums and reserves for the savings portion we will use the following notation. The notation is also summarized in Appendix A; the derivation of the formulas is given in Appendix B.

- W Maturity refund.
- n Policy term in years.
- q Probability of a policy becoming void during a year because of a major loss.
- t Years elapsed since the policy incepted.
- i Annual rate of interest guaranteed in the policy.
- v Conversion into present value per year = $1/(1+i)$.
- β Expense rate for administration of the savings portion (annual payment).
- β' Expense rate for administration of the savings portion (lump sum payment).
- δ Commission rate for premium collection.

Premiums

The annual payment premium P for the savings portion is given by

$$P = \frac{W(1-q)^n v^n}{\left(\frac{1-(1-q)^n v^n}{1-(1-q)v}\right)} \times (1+\beta+\delta) . \tag{1}$$

The premium for payment in lump sum P' is given by

$$P' = \frac{W(1-q)^n v^n}{\left(\frac{1-(1-q)^n v^n}{1-(1-q)v}\right)} \times (1+\beta'+\delta) \times \frac{1-v^n}{1-v} . \tag{2}$$

Note that when a lump sum contract becomes void because of a major loss, part of the paid premium is refunded, depending on the remaining term of the policy. This is done to maintain equity with the annual payment plan.

Reserves for Maturity Refund

${}_tV$ Reserve when t years have passed since the inception of the policy.

${}_tV_m$ Reserve when more than $t-(m+1)/12$ years and less than $t-m/12$ years have passed since the inception of the policy.

For annual payment policies, the reserves are given by

$$ {}_tV = W \times \frac{(1-q)^{n-t}v^{n-t}-(1-q)^n v^n}{1-(1-q)^n v^n} \tag{3} $$

and

$$ {}_tV_m = {}_tV \times (1-q)^{\frac{2m-1}{24}} v^{\frac{2m-1}{24}} . \tag{4} $$

For lump sum payment, the reserves are given by

$$ {}_tV' = W \times \frac{(1-q)^{n-t}v^{n-t}-(1-q)^n v^n}{1-(1-q)^n v^n} + W \times \frac{(1-q)^n v^n \times (1-(1-q)v)}{1-(1-q)^n v^n} \times \frac{1-v^{n-t}}{1-v} \tag{5} $$

and

$$ {}_tV_m' = {}_tV' \times (1-q)^{\frac{2m-1}{24}} v^{\frac{2m-1}{24}} . \tag{6} $$

Reserves for Policyholder Dividends

k Means the k-th policy year.

${}^sP$ Annual pure premium (excluding expenses) for the savings portion.

${}_{(n)}i_k$ Actual yield in the k-th year, on investments for n-year policies.

Then we can define ${}_{(n)}r_k = \frac{1+{}_{(n)}i_k}{1-q}$.

From Equation (1) we can see that

$$P = {}^{S}P \times (1+\beta+\delta) \tag{7}$$

and

$${}^{S}P = W \times (1-q)^{n} v^{n} \times \frac{1-(1-q)v}{1-(1-q)^{n} v^{n}} . \tag{8}$$

For annual payment plans, the reserve for policyholder dividends is equal to $\sum_{k=1}^{t} A_k - {}_tV_m$, where

$$A_k = \begin{cases} {}^{S}P \times {}_{(n)}r_t^{\frac{23-2m}{24}} & \text{for } k=t, \\ {}^{S}P \times \prod_{j=k}^{t-1} {}_{(n)}r_j \times {}_{(n)}r_t^{\frac{23-2m}{24}} & \text{for } k<t. \end{cases} \tag{9}$$

For lump sum payment, the reserve for policyholder dividends is equal to $\sum_{k=1}^{n} B_k - {}_tV_m'$, where

$$B_k = \begin{cases} {}^{S}P \times (1-q)^{k-1} v^{k-1} \times \prod_{j=1}^{t-1} {}_{(n)}r_j \times {}_{(n)}r_t^{\frac{23-2m}{24}} & \text{for } k \le t, \\ {}^{S}P \times (1-q)^{t} v^{k-1} \times \prod_{j=1}^{t-1} {}_{(n)}r_j \times {}_{(n)}r_t^{\frac{23-2m}{24}} & \text{for } k>t. \end{cases} \tag{10}$$

An Example of a Savings-Type Policy

As an example of a savings-type policy, we will look at "Super Chance" and "Fine," which are nicknames of "Long-Term Personal Accident Insurance with Maturity Refund." These are the most popular savings-type insurance products. "Super Chance" emphasizes savings; the savings portion is an extremely high part of the total premium. "Fine" balances both savings and indemnity; the savings portion is not as large.

The policy covers death or disability, caused by an accident. The face amount of the policy is paid in the event of death or a major disability such as the loss of both eyes. Lesser amounts are paid for other scheduled injuries. In the six months after an accident, the policy also pays a "confinement daily indemnity" while the insured is totally disabled, or up to 90 days of "attendance daily indemnity" while partially disabled. For this policy, a major loss is defined as payment of the full amount of insurance, either from one accident (e.g., the death of the insured) or a series of smaller losses in the same policy year. A typical selection of policies would be as follows:

Plan	Super Chance	Fine	Fine
Method of payment	Lump Sum	Lump Sum	Annual
Policy Term n	5 years	5 years	5 years
Maturity Refund W	¥1,000,000	¥1,000,000	¥1,000,000
Coverage			
- Face Amount	¥7,270,000	¥20,000,000	¥20,000,000
- Confinement daily indemnity	¥2,400	¥10,000	¥10,000
- Attendance daily indemnity	¥1,200	¥5,000	¥5,000
Premium of non-savings-type insurance	¥58,753	¥186,253	¥45,120

The maturity refund of ¥1,000,000 on all three is approximately U.S. $7,700.

The underlying factors we shall use for these examples are as follows:

v	Discount rate	1/(1+0.05)
q	Annual probability of major loss	4/10,000
β	Administrative expense (annual)	0.3%
β'	Administrative expense (lump sum)	0.2%
δ	Commission for collection	1.0%

Using Equations (1) and (2) with these values gives the premium for the Basic Clause for each example. These can be split as follows (for simplicity the prime is omitted in the formulas for the lump sum plans):

	Super Chance	Fine	Fine
	Lump Sum	Lump Sum	Annual
Savings portion ^{s}P	¥782,556	¥782,556	¥172,143
Administration expense $\beta \times {}^{s}P$	1,565	1,565	516
Commission for collection $\delta \times {}^{s}P$	7,826	7,826	1,721
Premium for Basic Clause P	¥791,947	¥791,947	¥174,380

The underwriting premium (i.e., the premium charged the insured) is the sum of the premium for the Basic Clause and the premium for the non-savings-type insurance. The components also can be arranged as:

	Super Chance	Fine	Fine
	Lump Sum	Lump Sum	Annual
Savings portion	¥782,556	¥782,556	¥172,143
Compensatory portion	68,144	195,644	47,357
Underwriting premium	¥850,700	¥978,200	¥219,500

Here the compensatory portion includes all the expenses and the pure insurance premium, and the savings portion is the deposit that earns interest.

Under all these plans, if no major loss occurs, the insured would receive ¥1,000,000 at the end of five years, plus a possible dividend. "Super Chance" provides the same maturity refund as "Fine", but at a lower premium. This is

accomplished by giving considerably less insurance coverage. 92% of the "Super Chance" premium is in the savings portion; only 80% is for "Fine."

Suppose the insured suffers a major accident during the second year of the policy. Under the annual payment "Fine" plan, the insured would have made two premium payments. The insurance company would pay the policy limit of ¥20,000,000, the policy would terminate, and the insured would not get any maturity refund. With a lump sum payment plan, the company also would return the prepaid premium for the remaining three years. In either case, there is no refund of premium for the partial year in which the accident occurred.

The guaranteed yield on the savings portion is 5%. The actual yield on the lump sum plans if no major loss occurs is 5.026% ($782,556 \times 1.0526^5 = 1,000,000$). The "extra" 2.6 basis points in effect come from those who do have a major loss and do not receive a maturity refund. The additional yield is quite small in this example because the probability of a loss is so low.

V. COMPARISON TO U.S. PRODUCTS

Endowment life insurance and retrospective rating plans as used in the United States share some elements with the savings-type policy. A comparison to these products will help with the understanding of the Japanese policy.

Endowment Life Insurance

Endowment life insurance is the U.S. insurance product that is closest in spirit to the Japanese savings-type policy. Endowment life policies pay the full face amount of the policy at the death of the insured, or at the end of the

policy period, whichever comes first. They are commonly written for terms of ten to thirty years. Thus, they share the essential features of the savings-type policies: they are a long term personal insurance, and the insured gets a substantial return at maturity if there are no losses. (Of course, the loss trigger in this case is a life exposure, rather than property/casualty.)

The value at inception of an endowment insurance for a face amount of 1 is

$$A_{x:\overline{n}|} = \sum_{t=0}^{n-1} v^{t+1} \frac{d_{x+t}}{l_x} + v^n \frac{l_{x+n}}{l_x} .$$

For non-life insurance, we can simplify this by assuming that the probability of a loss in any one year is a constant, q. Then

$$l_{x+n} = (1-q)^n \, l_x \qquad \text{and}$$

$$d_{x+n} = q(1-q)^n \, l_x .$$

The value of the endowment insurance then reduces to

$$A_{(q):\overline{n}|} = \sum_{t=0}^{n-1} v^{t+1} \, q(1-q)^t + v^n (1-q)^n$$

$$= vq\left(\frac{1-v^n(1-q)^n}{1-v(1-q)}\right) + v^n(1-q)^n .$$

As you can see, the cost of an endowment insurance, like a savings-type policy, has a pure insurance component, given by the first part of the formula, and a savings component, given by the second. Of course, the maturity refund under a savings type policy is not necessarily the same as the policy limit, but that can be accommodated by multiplying the second term of the above equation by W. Also, the pure insurance component here only covers major losses. Savings-

type policies also cover minor losses; so the pure insurance premium is calculated separately, as shown above.

The equations given in the previous section, for premiums and reserves, can be derived from the comparable life formulas by a similar process of substituting a constant q for q_x.

Retrospective Rating Plans

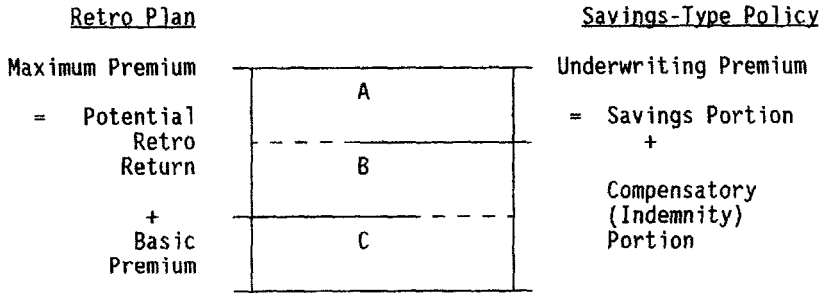
Retrospective rating plans, used for the casualty lines in the United States, also share some features with the Japanese savings-type policies. In its simplest form, the insured's final cost under a retro plan is given by

Retro Premium = Basic Premium + Incurred Loss

but not more than a specified Maximum Premium. The factors are set contractually, at inception.

If the Maximum Premium is collected at inception, the plan works very much like a savings-type policy. The Basic Premium covers the company expenses and the pure insurance cost; the additional premium is returned to the insured if there are no losses. In some cases, the insurer may even pay a dividend in addition to the contractually guaranteed retro return premium.

The insurance provided under a retro plan is usually analyzed as aggregate excess insurance. The insured pays for any losses up to the amount that can be contained within the Maximum Premium; the insurer is only at risk if total losses exceed the Maximum. Savings-type policies can be analyzed in the same way also. Ignoring cash flow, the following illustrates how the premium is divided under the two products:



Under a retro plan, the compensatory portion (B+C) would be called the guaranteed cost premium; that is, the fixed premium that would be charged if there were no retro plan. Under a savings-type policy, the potential retro return (A+B) would be called the maturity refund. In other words, the excess of the maturity refund over the savings portion is not derived entirely from investment earnings; some of it is paid out of the savings portions forfeited by policyholders who did have a major loss. We will refer to this as the aggregate excess effect.

It should be noted that the relative areas of the above diagram will vary considerably, depending on the type of insurance. For a retro policy, the areas shown might be representative. For a typical savings-type policy, area A would be much larger. Area B would be quite small, because the probability of a loss is normally very low for these policies.

So, the savings-type policies, like endowment life insurance, are usually analyzed as the sum of a level insurance component, and a pure endowment. The CAS literature has generally focused on retrospective rating as aggregate excess insurance. However, Jordan shows how an endowment life insurance policy is

equivalent to a combination of a savings fund and a decreasing term insurance.[3] This is the life insurance equivalent of the aggregate excess analysis.

VI. FUTURE PROSPECTS

In the Japanese Market

Insurance companies in Japan are trying not only to develop various kinds of savings-type insurance products to meet the requirements of their policyholders but also to enlarge the return on investments so that policyholders can receive larger dividends. In that sense investments are now more important for the management of insurance companies than in the past, and every company is making great efforts to build up a good investment team.

As to new product development, one major insurer has plans to introduce the following products as short term targets:

1. variable amount insurance,
2. personal pension insurance (permanent policies), and
3. application of savings-type insurance in fields other than fire or accident insurance.

If you have some knowledge of variable life insurance,[4] it may be easier to understand the variable non-life insurance. In short, variable non-life insurance is a combination of traditional insurance and a stock investment trust.

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[3] Jordan, C. W., Jr., *Life Contingencies* (The Society of Actuaries, 1975), pp. 90-92.

[4] see Wood, G. L., Lilly, C. C. III, Malecki, D. S., and Rosenbloom, J.S., *Personal Risk Management and Insurance*, Vol. I (American Institute for Property and Liability Underwriters, 1984) pp. 380-382.

Personal pension insurance is a combination of insurance and a pension. Plans are to develop non-life pension plans using the functions of the savings-type policy. Regarding the greater variety of insurance offered on savings-type policies, there will undoubtedly be many new ideas.

In summary, we would like to stress that the most vigorous, challenging, and highest growth field in Japanese non-life insurance certainly consists of savings-type insurance. Furthermore, we believe these policies will become the key products in the development of non-life insurance companies in Japan as the regulations governing the operation of financial industries are relaxed in the near future.

In the U.S. Market

It is much more difficult to predict the future for savings-type policies in the United States. As far as we know, no company has tried marketing a non-life savings-type policy in the United States. In this section, we will try to explore how such a product might be received in the United States, and some of the issues that would have to be addressed.

The Japanese propensity to save is cited as a major reason for the popularity of savings-type policies. Americans simply do not save anywhere near as much of their income. However, there are some people who save in the United States, usually the older, more established individuals. For some personal lines products, this is the preferred market. So, while the market of savers would be a considerably smaller proportion of the population in the United States, this product might be used to target profitable niches.

Another key to the success of savings-type policies in Japan is that they are an advantageous savings vehicle. First, savings-type policies in Japan have tax advantages, as explained above. In the U.S., the likely tax treatment would be that any refund in excess of the premium paid would be treated as taxable income. The only tax advantage might be that it would not be taxed until paid, since the maturity refund is always contingent on having no major losses.

A second advantage of savings-type policies is that interest on some consumer savings accounts in Japanese banks is limited by government regulation. The savings-type policies guarantee 5% as a minimum, and dividends can make the yield much higher. (This may be one reason why savings-type policies have evolved as a personal lines product in Japan, rather than commercial.) A similar situation existed twenty years ago in the U.S., when the Federal Reserve Board's Regulation Q set maximum rates. However, today U.S. bank interest rates have been deregulated. So, insurers' investment income alone would not justify higher rates on savings-type policies than is available on CD's or money market funds.

In fact, the statutory accounting and tax rules applying to U.S. non-life insurers would reduce the yields they could offer. A company writing a savings-type policy would have to put up a reserve for future maturity refunds -- including the guaranteed interest. This reserve probably could not be discounted without changes in the statutory accounting rules. Like the reserve for retro return premiums, it would be booked as part of the unearned premium reserve. Under U.S. tax law, 20% of the UPR is counted as taxable income. So, a U.S. insurer would have to pay 34% (the corporate tax rate) of 20%, or 6.8% of the maturity refund in federal income tax. This would be recoverable when the policy

terminates or matures, but in the meantime it represents funds on which the insurer is not earning interest.

The situation is similar for premium tax. The savings portion of the premium would be taxed like any other written premium, at around 3%, depending on the state and line. A maturity refund would generate a tax credit, but again the insurer loses the investment income. Also, if a major loss occurs and the premium becomes fully earned, no premium tax credit is generated.

The combination of federal income tax and premium tax means that about 10% of the savings portion of the premium would not be held by the insurer, even before considering pre-paid expenses. Furthermore, property/casualty insurers have to pay federal income tax on their investment earnings; they cannot accumulate earnings tax free like life insurers.

The result is that a U.S. savings-type policy, in order to offer attractive yields on the savings portion, would have to rely more on the aggregate excess effect. This in turn would require a product with a higher probability of loss. That is, it would have to be a riskier investment for the policyholder.

We previously compared savings-type policies to endowment life insurance and retrospective rating plans. Retro plans are only used in the United States for large commercial accounts, where the losses are somewhat predictable. Their usage probably will not tell us much about personal lines savings-type policies. However, the role of endowment insurance in the U.S. may give an idea of how savings-type policies might be marketed and received.

Because of the guaranteed payment provision, an endowment policy must build a cash value equal to the face amount by the maturity date. Thus, the premium for an endowment policy is greater than for a whole life policy, which builds a lesser cash value over the same period. Whole life is in turn more expensive than a term policy (which builds no cash value) covering the same period. In the U.S. market, the competition for sales has been between term and whole life; endowment insurance is not popular except for specialized needs.

To illustrate the American attitude towards endowment policies, the CPCU text on the subject states endowment policies should be considered only when the primary need is for savings. Endowment policies can be used to provide retirement funds, or an educational fund for a child. They should not be used to meet permanent insurance needs. The premium dollars that an individual can (or is willing to) pay should be allocated first to buying an adequate amount of insurance, and only then to the higher cost of endowment policies.[5] As a result, endowment life is not a major product in the U.S. market. Paying a higher premium to build up additional savings has not had broad appeal.

Another issue to resolve is the compatibility of savings-type policies with existing insurance laws and regulations. Development of savings-type policies in Japan was helped by having only one regulatory authority to deal with. In the United States, rate and forms approval would have to be addressed state by state. Terminating the policy and forfeiting the maturity refund if a major loss occurs might conflict with some state laws. Also, the reserving, accounting, and tax

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[5] Wood, G.L., *et al.*, *op. cit.*, pp. 377-380.

issues might require rulings from the National Association of Insurance Commissioners, or from the Internal Revenue Service.

In summary, it is easy to see barriers to the development of savings-type policies in the United States. But the phenomenal success of these products in Japan shows that the rewards could be great for anyone who could make it work in the United States.

Transition of Savings-type Insurance

As of July 1988

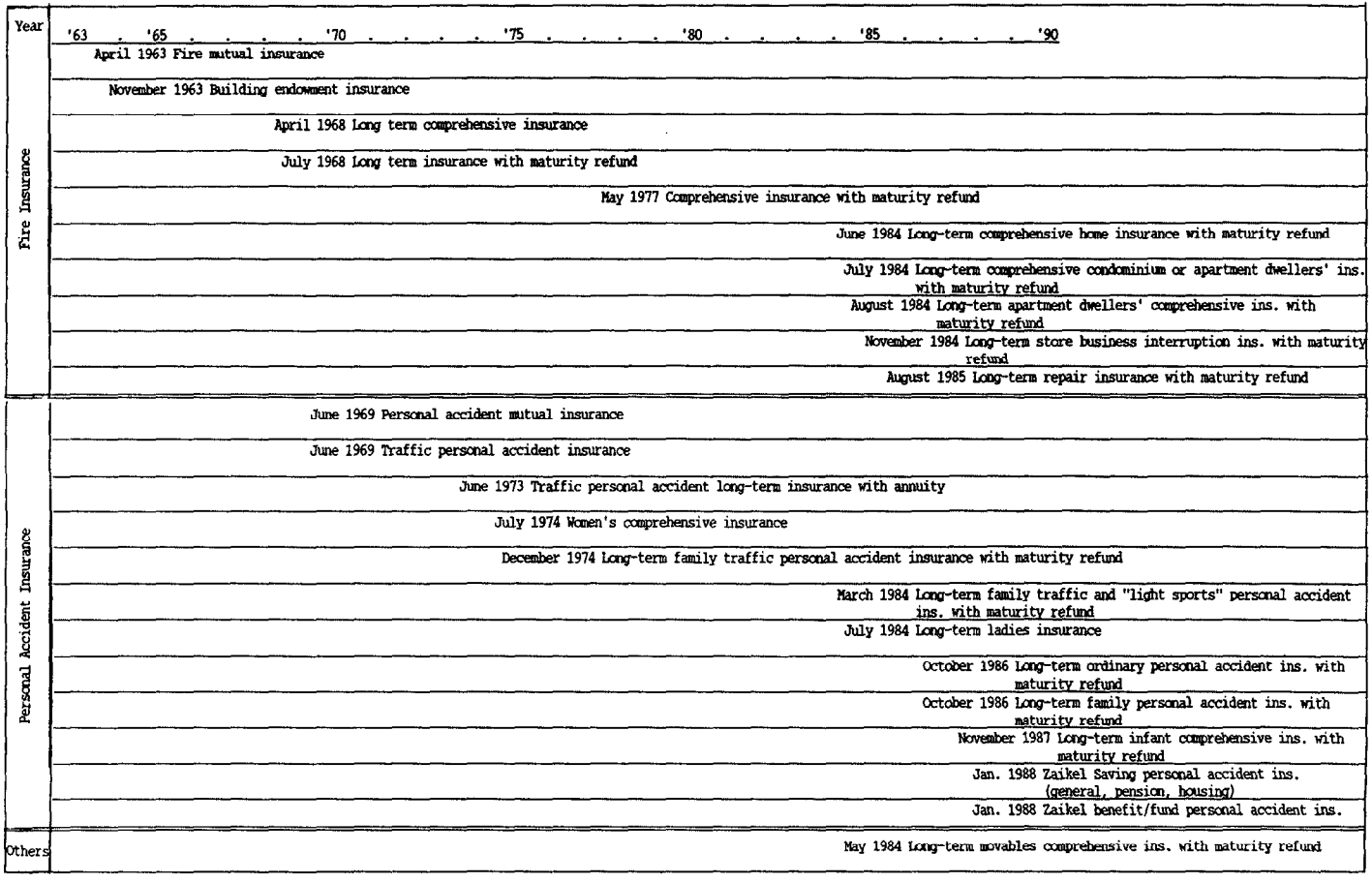


EXHIBIT 1

EXHIBIT 2

Development of Premium in Japan

Annual Average Growth Rate	Savings-type insurance premium	Traditional-type insurance premium	Total premium
from 1975 to 1988	23.6%	7.8%	10.7%

Total insurance premium
1989: 8,596

Premium in ¥ billion

Market share of savings-type insurance

0.7%	8.9%	8.0%	16.2%	18.7%	21.5%	23.6%	26.0%	30.9%	42.6%	36.3%	39.5%	37.1%

Development of Assets in Japan

Proportion of savings-type insurance assets

16.0%	20.0%	23.2%	27.5%	31.3%	33.3%	37.5%	45.7%	48.5%	51.3%	51.8%

EXHIBIT 3

EXHIBIT 4

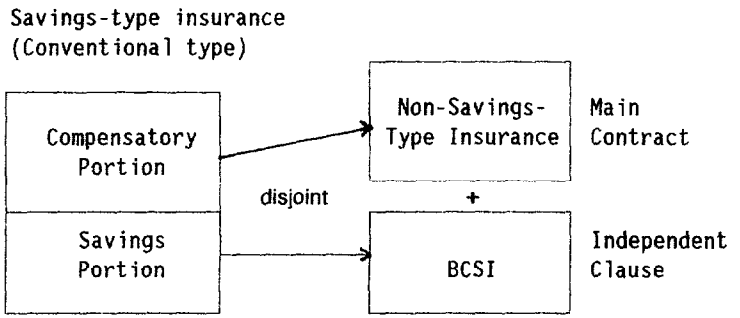
Development of Functions of Savings-type Insurance

As of October 1989

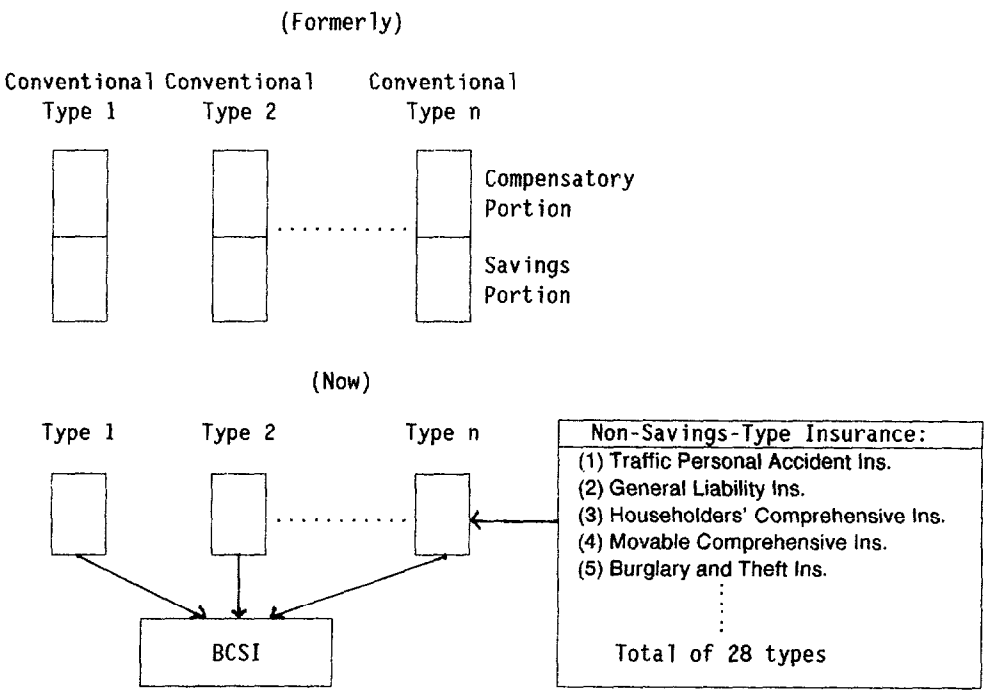
Year		1970	1975	1980	1985	1988	1989
Insurance Period	Property Insurance	(1969) 10 Years	(1974) 5 Years		(1984) 3 Years (1985) 6-9 Years		(1989) 10-20 Years
	Casualty Insurance			(1979) 5 Years	(1984) 3 Years, 4 Years 10 Years 6-9 Years		(1989) 10-20 Years
Methods of payment of premium	Property Insurance	(1969) lump sum payment, annual payment, semi-annual payment monthly payment, group monthly payment					(1989) down payment
	Casualty Insurance			(1979) lump sum payment, annual payment, semi-annual payment, monthly payment, group monthly payment		(1988) down payment	
Methods of payment of maturity-refund and claims	Property Insurance						(1989) installment payments of claims and maturity refund, deferred payment of maturity refund
	Casualty Insurance				(1987) installment payments of claims and maturity refund		(1989) installment payments of claims and maturity refund, deferred payment of maturity refund
Others	Property Insurance			(1983) premium transfer loan system			(1989) automatic renewal, policy conversion, premium adjust by maturity-refund
	Casualty Insurance			(1981) premium transfer loan system		(1988) fixed maturity date system (Zaikei)	(1989) automatic renewal, policy conversion, midterm refund payment

BASIC CLAUSE FOR SAVINGS-TYPE INSURANCE

What is "Basic Clause for Savings-Type Insurance" (BCSI)?



Change in the product structure of savings-type insurance.



APPENDIX A

SUMMARY OF NOTATION

W Maturity refund.

n Policy term in years.

q Probability of a policy becoming void during a year because of a major loss.

t Years elapsed since the policy incepted.

i Expected annual rate of interest.

v Conversion into present value per year = $1/(1+i)$.

d Discount rate = $1-v = iv$.

β Expense rate for administration of the savings portion.

δ Rate of commission for premium collection.

P Gross premium for the savings portion of the policy.

${}^{s}P$ Pure premium (excluding expenses) for savings portion.

${}_{t}V$ Reserve when t years have passed since the inception of the policy.

${}_{t}V_{m}$ Reserve when more than $t-(m+1)/12$ and less than $t-m/12$ years have passed since the inception of the policy.

k Means the k-th policy year.

${}_{(n)}i_{k}$ Actual yield in the k-th year, on investments for n-year policies.

$${}_{(n)}r_{k} = \frac{1+{}_{(n)}i_{k}}{1-q}.$$

$'$ Denotes premium or reserve for lump sum payment.

$A_{(q)\overline{n}|}$ n-year endowment ($A_{x\overline{n}|}$) where q_x is a constant q for all x.

APPENDIX B

DERIVATION OF FORMULAS

Premiums

Equation (1), annual payment premium:

$$P = \frac{W(1-q)^n v^n}{\left(\frac{1-(1-q)^n v^n}{1-(1-q)v}\right)} \times (1+\beta+\delta)$$

Proof: The present value of the maturity refund (discounted for interest and the probability of a major loss) must equal the present value of the premiums paid. So,

$$W(1-q)^n v^n \times (1+\beta+\delta) = P \times \sum_{t=0}^{n-1} (1-q)^t v^t$$

$$= P \times \frac{1-(1-q)^n v^n}{1-(1-q)v}$$

and rearranging terms gives Equation (1).

Equation (2), lump sum payment premium:

$$P' = \frac{W(1-q)^n v^n}{\left(\frac{1-(1-q)^n v^n}{1-(1-q)v}\right)} \times (1+\beta'+\delta) \times \frac{1-v^n}{1-v} .$$

Proof: Substituting β' for β in Equation (1), the lump sum premium must equal the present value of the annual premiums (discounted for interest). So,

$$P' = P \times \ddot{a}_{\overline{n}|}$$

$$= P \times \frac{1-v^n}{1-v}$$

Reserves for Maturity Refund

Equation (3), annual payment premium:

$$ {}_tV = W \times \frac{(1-q)^{n-t}v^{n-t}-(1-q)^n v^n}{1-(1-q)^n v^n} $$

Proof:

If $A_{(q)\overline{n}|} = (1-q)^n v^n$, $\ddot{a}_{(q)\overline{n}|} = \sum_{t=0}^{n-1}(1-q)^t v^t$

then $A_{(q)\overline{n}|} + d\ddot{a}_{(q)\overline{n}|} = 1$

and $({}^sP + d)\ddot{a}_{(q)\overline{n}|} = 1 \qquad (\because A_{(q)\overline{n}|} = {}^sP\,\ddot{a}_{(q)\overline{n}|})$.

Then
$$ {}_tV = W \times (A_{(q)\overline{n-t}|} - {}^sP\ddot{a}_{(q)\overline{n-t}|}) $$
$$ = W \times (1 - ({}^sP + d)\ddot{a}_{(q)\overline{n-t}|}) $$
$$ = W \times \left(1 - \frac{\ddot{a}_{(q)\overline{n-t}|}}{\ddot{a}_{(q)\overline{n}|}}\right) $$
$$ = W \times \frac{(1-q)^{n-t}v^{n-t}-(1-q)^n v^n}{1-(1-q)^n v^n}. $$

Equation (4) simply adjusts equation (3) for the partial year.

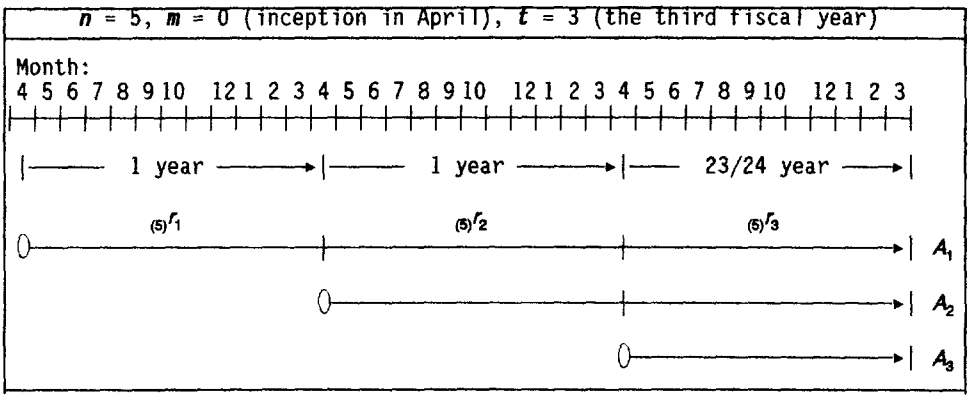
In equation (5), the reserve with lump sum premium payment is the annual payment reserve plus the present value of the future annual payments:

$$ {}_tV' = {}_tV + {}^sP \times \ddot{a}_{\overline{n-t}|} $$
$$ = W \times \frac{(1-q)^{n-t}v^{n-t}-(1-q)^n v^n}{1-(1-q)^n v^n} $$
$$ + W \times \frac{(1-q)^n v^n \times (1-(1-q)v)}{1-(1-q)^n v^n} \times \frac{1-v^{n-t}}{1-v} $$

Similarly to equation (4), equation (6) adjusts equation (5) for the partial year.

Reserves for Policyholder Dividends

The calculation of the reserve for policyholder dividends is best shown by a diagram of a particular example. For an annual payment plan:



We need to set the reserve as of the end of the Japanese accounting year, which is March 31. We assume the average policy incepts in the middle of the month. Then, as of the valuation date, this policy has been in force for 2 and 23/24 years,[6] and the insured has made three premium payments.

Each A_k represents the accumulated value of ${}^{s}P$, the savings portion of one of those premium payments. Each year, the value is increased by interest. It is also increased because there have not been any major losses (policies with a major loss have lapsed and no reserve is needed). The original premium is discounted for the chance that a major loss can occur; as this contingency is removed (i.e., as a year passes without loss) the reserve value increases. The

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[6] Note that $\frac{23-2m}{24} = \frac{23-2\times 0}{24} = \frac{23}{24}$.

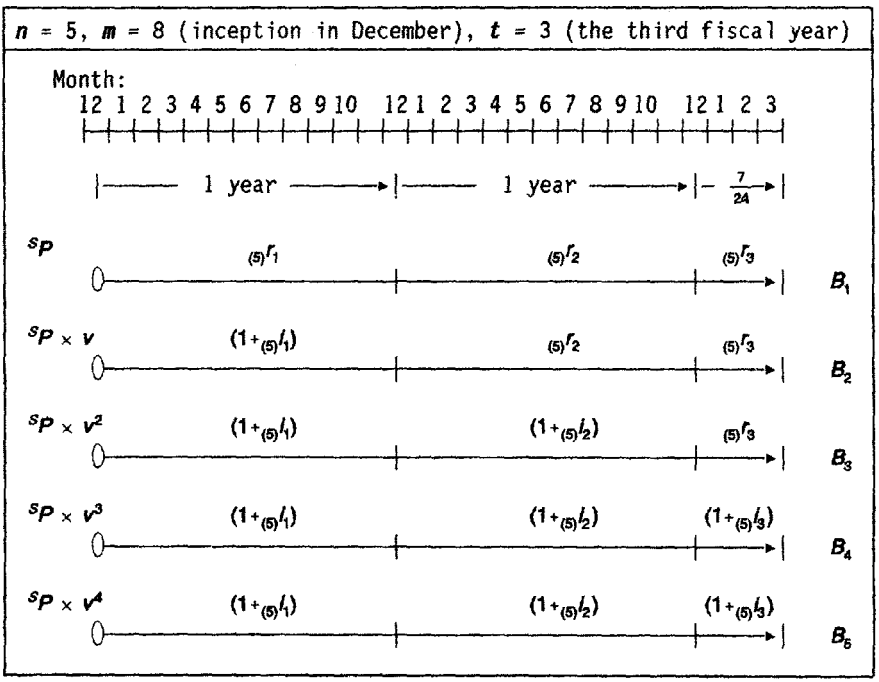
factor ${}_{(n)}r_t$ combines both interest and the removal of the loss contingency. Thus we have:

$$A_1 = {}^{s}P \times {}_{(5)}r_1 \times {}_{(5)}r_2 \times {}_{(5)}r_3^{\frac{23}{24}}$$

$$A_2 = {}^{s}P \times {}_{(5)}r_2 \times {}_{(5)}r_3^{\frac{23}{24}}$$

$$A_3 = {}^{s}P \times {}_{(5)}r_3^{\frac{23}{24}}$$

For a lump sum payment plan, the diagram is somewhat more complicated, because we must account for the investment of the prepaid premium:



For this diagram, we have split the savings portion of the lump sum premium into five pieces, ${}^{s}P$, ${}^{s}P \times v$, ${}^{s}P \times v^2$, etc., as shown in the left-hand column. These pieces are the present value at inception of the savings portion for each policy year. From Equations (2) and (8) we can see that:

$$
\begin{aligned}
{}^{s}P' &= {}^{s}P \times \frac{1-v^5}{1-v} \\
&= {}^{s}P + {}^{s}Pv + {}^{s}Pv^2 + {}^{s}Pv^3 + {}^{s}Pv^4 .
\end{aligned}
$$

Each piece is accumulated for interest as in the annual payment case. The difference arises in when the loss contingency starts to apply to each piece. If a loss occurs in the first year, the insured forfeits B_1 but gets a refund of B_2 through B_5. The payout of only B_1 is subject to the contingency of a loss in the first year. The other pieces are available for payout whether or not there is a loss in the first year. So, B_1 is increased for the removal of the first year loss contingency; the other pieces are increased only for interest in the first year. B_2 comes subject to the loss contingency in the second year, B_3 in the third year, etc.

As an example of the first case where $k \le t$, we see that:

$$
\begin{aligned}
B_3 &= {}^{s}P \times v^2 \times (1 + {}_{(5)}i_1) \times (1 + {}_{(5)}i_2) \times {}_{(5)}r_3^{\frac{7}{24}} \\
&= {}^{s}P \times v^2 \times (1-q)^2 \times {}_{(5)}r_1 \times {}_{(5)}r_2 \times {}_{(5)}r_3^{\frac{7}{24}} \qquad \left(\because {}_{(5)}r_t = \frac{1 + {}_{(5)}i_t}{1-q} \right)
\end{aligned}
$$

For the case where $k>t$, we have:

$$B_5 = {}^sP \times v^4 \times (1+{}_{(5)}i_1) \times (1+{}_{(5)}i_2) \times (1+{}_{(5)}i_3)^{\frac{7}{24}}$$

$$= {}^sP \times v^4 \times (1-q)^3 \times {}_{(5)}r_1 \times {}_{(5)}r_2 \times {}_{(5)}r_3^{\frac{7}{24}} \times (1-q)^{\frac{-17}{24}}$$

$$\approx {}^sP \times v^4 \times (1-q)^3 \times {}_{(5)}r_1 \times {}_{(5)}r_2 \times {}_{(5)}r_3^{\frac{7}{24}}$$

The approximation in the last step is valid as long as q is small.

AUTO INSURANCE IN ITALY

BY TERRY G CLARKE AND LAURA SALVATORI

BIOGRAPHY:

Terry Clarke is a Vice President of Tillinghast in their London office in the United Kingdom. Prior to joining Tillinghast, he was Group Actuary for the Norwich Winterthur Group which includes the Norwich Winterthur Reinsurance Company. He qualified as a Fellow of the Institute of Actuaries in 1967. Currently, he is Vice President of the Institute and Chairman of the General Insurance Joint Committee of the Institute and Faculty of Actuaries. He was a co-author of an Institute Paper "Some Financial Aspects of a General Insurance Company".

BIOGRAPHY:

Laura Salvatori is a consultant with Tillinghast in their London office in the United Kingdom. Prior to joining the London office she worked in the Sydney office of Tillinghast. Her previous experience was with Unione Italiana Riassicurazione. She has a degree in statistical and actuarial science from "La Sapienza" University, Rome in 1982. She is a member of the National Order of Italian Actuaries and the Italian Institute of Actuaries. She is also an affiliate member of Institute of Actuaries (UK).

ABSTRACT:

The paper describes the motor market in Italy and the impact that the EC directive may have over the next few years. The structure of the rating system, the level of tariffs deductibles, cover and policy duration are also described. Currently the third party motor tariffs are controlled by the State and the paper describes the methodology used by the Filippi committee to determine the level of the Bonus-Malus Tariff. Finally, the paper briefly describes the general approach to reserving in Italy and the role of ISVAP, the regulatory authority.

1. INTRODUCTION

1.1 Motor third party liability, or *Responsabilita' Civile Auto* (RCA), is the largest class of business in the Italian insurance market; in 1989 it represented 44% of the total volume of non-life business and more than 33% of the total insurance premium volume.

1.2 Table 1 analyses the premium volume for all classes of insurance over the past three years.

Table 1
Insurance Premium Volume

Lit. Billion	1987	1988	1989
RCA	8,283	8,820	9,852
Other	9,802	10,986	12,527
Total Casualty	18,085	19,806	22,378
Life Insurance	4,994	6,304	7,319
Total	23,079	26,110	29,697

Source: ISVAP

1.3 The total market has grown over the period 1987 to 1989 at an average rate of around 13%, compared with an average inflation rate of 5% in 1988 and 6.6% in 1989. The proportion represented by RCA has started to decline in