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AN ASIAN RESEARCH PROGRAM IN INSURANCE

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The idea of a research program in insurance is not a new one. For example, on November 17, 1943 or over 30 years ago, Professor Ralph H. Blanchard of Columbia University, in his presidential address at the 30th Annual Meeting of the Casualty Actuarial Society held at the Hotel Baltimore in New York City, strongly urged that "insurance interests would do well to set up a research organization whose function would be to study thought and practice in all phases of insurance and to report facts and conclusions." The spirit of the researcher should be that of the scientist. Research should be critical in the sense of seeking accurately to evaluate data and conclusions from data. Research should be contructive in the sense of being always bent on eliminating the unsound and promoting adoption of the sound. The primary purpose of research should be to keep insurance in advance of, or at least in tune with the times.

Even though insurance is a tradition-bound business, usually slow to innovate and sometimes shackled or hampered by regulation, we cannot ignore the fact that scientific information today has a half-life of less than ten years. This means that in less than ten years, half of today's scientific knowledge will be obsolete. As the English poet Percy B. Shelley aptly put it more than a century ago: "MAN'S YESTERDAY MAY NE'ER BE LIKE HIS MORROW. NOUGHT MAY ENDURE BUT MUTABILITY." Consequently, like other lines of human endeavor, the insurance industry must learn to keep up with change. To be able to do so, the insurance industry

must be willing to invest money, time, manpower and brains in a continuing research program.

Let us now go briefly over some events or trends which the winds of change are generating in our business:

SOCIAL INVOLVEMENT: Business firms are now being expected to help tackle social problems of ecology, poverty, discrimination and urban sprawl or irregular distribution. Employers are now told not to discriminate between sexes, color, creed or race. Employers are being expected to go beyond merely fulfilling the economic needs of their employees; today, our employees look for job fulfillment, work which gives meaning to their lives. We now have to contend more and more with this new force called "CONSUMERISM". All of these require changes in insurance company management philosophy and behavior.

DIVERSIFICATION: To be able to serve a broader spectrum of human needs, business enterprises had to diversify growth through affiliates, subsidiaries, holding companies, conglomerates and other large, broadly based business enterprises. Insurance has to follow suit by reorganizing around larger and more flexible corporate structures to be in a position to offer more and more complete financial services to the public. In the U.S.A., nearly all of the 50 largest property-liability insurance companies have life affiliates and conversely all of the 10 largest stock life insurance companies have property-liability insurance affiliates. More than 75% of the largest life insurance companies in America are developing or already offering variable annuities. We can expect this trend to follow to some extent in other countries of the world because it is a good business policy to maximize the utilization of financial capacity as well as the use of sales and administrative personnel.

INTERNATIONAL AND COOPERATION BETWEEN THE GOVERNMENT AND THE INSURANCE INDUSTRY: As our industry is based on the principle of averages and the laws of probabilities, we have in the past been able to achieve healthy growth largely by providing coverage for risks which are generally considered as insurable and at adequate premium rates. Recently, however, pressure from the government as well as the public sectors has increased to the extent that the companies in some countries have to

provide coverage for risks which do not meet the traditional concept of insurance risks. For example, some companies had to cooperate with the government in providing coverage for property exposed to flood or to crime and fire for property located in extra hazardous urban areas, like some parts of the Mississippi valley and the ghettos in certain American cities. In the area of Health-Care Insurance, President Nixon in a radio speech to the American people last May 20 offered a compromise solution for adequate national health-care coverage which avoids the socialization of the American system of health care. President Nixon's compromise proposal contained the following three essential basic ingredients: (1) Patients must be free to choose their own physicians; (2) The program must be built on the existing private system of health care and not tear down that system; (3) It must give all parties—consumers, providers and carriers of health services as well as state governments—a direct stake in making the system work. President Nixon's compromise proposal for national health-care and his plea for support from the insurance industry was prefaced by his admission that 25 million Americans have no health-care insurance whatsoever; that fewer than half of all those under thet age of 65, and virtually none above that age, are covered against the ruinous cost of what has quite properly come to be known as catastrophic illness and that the average daily hospital bill in America now exceeds $110.00 and still going up.

NOVEL CONCEPTS IN INSURANCE PACKAGING: A single policy issued by one company to insure the property-liability exposures found in a single house; or the property-liability exposures of owning or operating a single automobile, are ideas which has become a reality. Today, there is increasing interest in a family account plan and the so-called life cycle policy. A family account plan would enable an insured to make a single monthly payment under a single account billing covering the entire range of financial services, including insurance, required by the family. A life cycle policy, as it is being discussed in actuarial circles in America, would blend varying amounts and types of life insurance to provide varying mixtures or protection and savings from cradle to grave. Life insurance protection and savings would **increase** as family responsibilities increased through marriage and childbirth, and would **decrease** as the insured approached retirement age. The life

cycle policy concept can readily be broadened to include full family protection through the addition of health-care insurance and property-liability coverages. The resulting bundle of coverage could well be called a Master Insurance Package.

The events or trends which I have just described as actually happening in the insurance industry could have been anticipated or at least some positive action or measures could have been taken by the industry long before their happening to make us better prepared for the changes. A well organized and properly directed research program is, therefore, called for if we hope to keep insurance in advance of, or at least in tune with the changes of the times.

As I have stated before, insurance is the application of the principle of averages so as to insure financial security. Insurance is the exact opposite of gambling. By the method of averaging, the fortunate majority pay for the losses incurred by the minority on account of unavoidable contingencies and this is done by the pooling of resources. A good knowledge of statistics and the theory of probabilities is, therefore, essential for at least one person in the research team: The insurance statistician or actuary is thus the first person who must enter the field of research. Actuaries have long been engaged in research in the life insurance field, but in non-life insurance (except possibly in workmen's compensation) actuarial theory and methods were only applied quite recently, specifically in 1957 when at the XV International Congress of Actuaries in New York, it was decided to create a section to be known as ASTIN which stands for Actuarial Studies in Non-Life Insurance. This move was deemed important because in applying probability theory to life insurance, what is known as the "individual risk approach" was adopted, but this approach does not work so well in non-life or general insurance. The "individual risk approach" was found vey satisfactory in life insurance work because a mathematical model closely following experience could be built up and the fluctuations from such model were amenable to control and prediction. It was not until about 1930 that what is now known as the "collective risk theory" came into the picture and found eminently satisfactory for application in non-life or general insurance. Although the "collective risk theory" was actually the brain-child of Dr. FILIP LUNDBERG who first wrote about it in 1909, it was not till ten years later that it took a young Swedish mathematician by the name of HARALD CRAMER (then taking a job

with the Royal Insurance Board of Stockholm) to develop the ideas of Dr. Lundberg and combine them with proposals of his own for practical application to reinsurance problems. In Mr. Cramer's paper which was published in 1919 by the Royal Insurance Board in Stockholm, he founded the whole theory on the assumption that the occurrence of claims in an insurance business follows what we now call a simple POISSON process.

In 1930, Mr. Cramer published in the Jubilee Volume of the Skandia Insurance Company a survey of risk theory, including several important works of Dr. Lundberg which appeared between 1920 and 1930. Then, during the years 1931 to 1935, more contributions appeared to the development of the collective risk theory by the birth of the general theory of STOCHASTIC processes in the works of KOLMOGOROFF, KHINTCHINE, LEVY and FELLER. As the collective risk theory forms the basis for modern research in non-life or general insurance, I would like to attempt to give you a general idea of the subject by using, with your indulgence, simple illustrations given by an Indian officer (Mr. C. S. ANANTHAPADMANABHAN) of the Department of Revenue and Insurance of the Government of India:

> "Think of a game between two opponents, viz. the insurance company represented by, say A and the totality of policyholders represented by, say B. Each side tries to maximize its gain or minimize its loss. The insurance company has an initial sum of money as capital and the opponent, that is today, the policyholders pay from time to time various sums of money as premiums and also take out, from time to time, various amounts as claims. The problem then is to study the statistical behavior of the flow of money between the two parties and to forecast the balance, positive or negative, in the hands of the insurance company in the long run." This is the gaming theory, including the study of the ruin of gamblers, which has been extensively developed for the application of the collection risk theory.
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> Another approach employed in the study of risk process in insurance is the so-called "RANDOM WALK". "Starting from an origin, a particle is imagined to move right or left along the axis. Each claim is represented by a step to the right and each premium payment by a step to the left. If we place a barrier at a certain distance, say X, to the right, the problem is to find the time it takes

for the particle to cross the barrier for the first time. If the limit X represents the financial resources of the company, the crossing of the limit by the particle indicates the financial ruin of the company. Specifically a numerical problem may be set up as follows: A company has 10,000 claims per year. The mean claim amount is equal to 1,000 monetary units. The yearly net premium is equal to 10 million monetary units. The company wants to be certain with probability 0.99 that it will not be ruined during thefirst 25 years of its operation." With the use of the Poisson distribution as an approximation to the probabilities of the occurrence of claims in general insurance, the solution to the problem shows that a risk reserve equal to 130% of the yearly net premium is necessary for the probabliity referred to previously. This is the amount of capital required."

Now, you will understand why a statistician or an actuary is the first type of person needed for a good research team.

Research plus the refinement of statistical methods have led to valuable contributions to progress in the field of practical underwriting in general insurance. For example, studies have been made of the statistical distribution of aggregate claims as well as claim ratio distribution. The by-product of these studies is the so-called EXPERIENCE RATING PLAN, which is now widely accepted as a sound rating tool. Of course, we cannot just blindly use any experience plan. We have to use one which is suited to the type of risk to be experience rated. Experience rating plans designed for casualty insurance do not fit property insurance simply because property insurance is different from casualty. Property insurance has lower claim frequencies but higher catastrophe hazards. Thus, in applying an experience rating plan to a multiple line policy, we have to find one best suited to the type of risks to be covered. Some plans are better than others and so we aim for the best plan possible. But since we will never have a perfect plan, we have to compromise between actuarial precision and the practical need for simplicity. This is where research and the compilation of good statistics or data come in: continuing research and the accumulation of accurate and more data will pay dividends to the industry by enabling it to use the results to produce better underwriting and adequate premiums—not too much nor too little.

A natural development of the Experience Rating Plan is the Credibility Theory. While the world "credibility" was originally introduced to indicate the credence that the actuary believes should be attached to a particular body of experience for rate making purposes, the use of the term has been extended to many rate making techniques associated with this general idea. In Europe, the development and application of mathematical models (constructed after certain "laws" are established by a combination of mathematics, careful research and general reasoning) which are then tested against actual data and subsequently used for further research are referred to as the Theory of Risk, the main application of which has been the study of the effects on the surplus of an insurance company of chance variation from average values.

While it is obvious from what I have discussed this afternoon that mathematics and statistical procedures are important tools for research in insurance, such tools are worthless unless we have available and reliable data with which to work. Therefore, the first essential is to collect detailed and properly assembled data. The statistical data collecting system must be carefully planned so that all the requisite data are made available. Data collected need not be voluminous so that it is important to exercise discretion in their gathering and compilation. In other words, a very essential step is to have our objectives well defined before we even start to collect data.

Another important aspect of research which I would like to stress upon, particularly in this assembly composed of representatives from most of the Asian nations, is the recognition of the fact that research should not be limited to national borders; on the contrary, research should be undertaken as a part of a world-wide activity. Hence, it behooves each and every one of us to open and keep close touch with each other. To begin with, let us build an extensive information system by collecting periodicals and publications bearing on insurance matters in our respective countries and exchanging them with those of our Asian neighbors. With the foregoing, we can build up a comprehensive library. Next, we should see to it that our research workers take part in all international conferences and meetings of insurance people. If the financing can be handled, we should also encourage visits to centres of research to see what is being done in other countries to open up new lines of inquiry or new perspectives.

In closing, I would like to repeat what my college classmate, Mr. Henry F. Rood, said in his address as the then President of the Society of Actuaries of America at the formal banquet closing the XVth International Congress of Actuaries on October 18, 1957. That was nearly 17 years ago, but the words of Mr. Rood are valid and relevant even to this day. According to Mr. Rood:

> "Insurance is just now coming into its own, with no limits of growth in sight, assuming sound government and sound economic conditions. The challenge facing our profession is only equaled by its bewildered responsibilities. Our efforts in the past have given the institution of insurance a sound foundation—a launching platform, so to speak—but its growing era lies ahead and while ours is not the task of riding a rocket, it is the equally heroic and difficult task of riding and directing an idea of boundless potentialities, the idea of human cooperation on a voluntary basis directed to the amelioration of economic loss resulting from casualty or death. To succeed in this area will be to undergird society, mortality and culture.
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> "From this challenge springs the urge to cooperate, to share, and to help, without regard for national boundaries, with all that this spirit implies of understanding, sympathy, and friendship. It is thrilling to speculate how far our industry may go in aid of peace and understanding through the development of an invisible bond of mutual helpers, with all the forces for good inherent in such a bond.
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> "It is my firm belief that ours is a scientific profession of equal dignity and importance with that of law, medicine and the ministry. I daily stand in awe as I contemplate our place in the sun of human affairs and the monumental responsibility it places upon the shoulders of each and all of us."