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ACTUARIAL RESEARCH—A CREDIT TO THE PROFESSION?

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1. Does the Society actually encourage major research projects? How could it do better?

2. Is the current research a sufficient response to the immediate and practical concerns of practicing actuaries? Is there a need for more broad developmental research and, if so, how can it be encouraged?

3. What are the major research and experience study requirements of actuaries at this time?

   a. For the short term?
   b. For the long term?

4. How should actuarial research be divided between universities and the Society of Actuaries? Between the Society and other actuarial organizations?

MR. ROBIN B. LECKIE: We have the privilege of conducting a little experiment this afternoon. The Program Committee kindly consented to squeeze in this session at my request to enable a few chosen experts plus three concerned members of the Board plus a self-selected group of interested members - that's you in the audience - to commence a review and dialogue on actuarial research. Hopefully this afternoon will shed some light on what the research requirements of actuaries are and how the profession might organize and manage research.

Any profession to survive and grow has two key accountabilities. It must bring in new members which, in our case, is through a self-directed educational process, and it must advance its technical base of knowledge. Thus, education and research have always been and must always continue to be a primary concern of the profession. And, of course, the Society of Actuaries has and will continue to be extremely active in both these areas.

As the Vice President supervising the Mortality & Morbidity Experience Study Committees, I have undertaken to develop a research plan for the Society. This session is part of that process. Our purpose this afternoon is to review current research activity and to put forth some thoughts on what needs to be done and how it ought to be carried out. Following the formal presentation, we hope to establish a three-way dialogue between the Board members, the experts panel and the audience.

Our listed panel has come up with a rather novel twist for this afternoon. We have delegated most of our work to a second panel which we refer to as our "Experts Panel". I would like to commence by introducing the Experts Panel. They are Tom Huber, Chairman of the Committee on Ordinary Mortality Experience, and representing this afternoon all of the Experience Study

Committees. Next is Dick Ziock, Chairman of the Committee on Research. Next is Stan Hughey, Chairman of the Actuarial Education and Research Fund. The fourth expert is Anna Rappaport, representing research for the Consultant. There is a fifth expert who was not able to be present today, Ed Lew, Past President of the Society of Actuaries and a very prominent researcher. I will be reading out a few remarks he has prepared for me for this session.

The Experts Panel follow very brief presentations by our Board Panel, consisting of Daphne Bartlett, who will be outlining the function of our Board Committee, John Wooddy, who will be making some recommendations for current actuarial research, and Ken Clark, who will outline how the Society might work with other actuarial organizations in a reorganized profession.

MRS. DAPHNE D. BARTLETT:

The Current Role of the Society of Actuaries in Research

A polite way to describe the current role of the Society of Actuaries in the area of Research is that it is somewhat passive. It seems as if the Society's Research function consists of the following:

1. Continuing what we have been doing routinely for years; and rarely discontinuing anything!

2. Reacting (usually very slowly) to requests for actuarial research from important publics - which does not seem to include our membership.

3. Once in a rare while, taking a little initiative to institute some research in anticipation of a future problem - but even then we seem to have a lot of trouble deciding whether the Society should be doing it or if it falls better into some other bailiwick.

Other research is performed under the auspices of the Society, of course. Papers are written, meetings frequently have sessions during which results of research are reported, and the discussions often include information on research performed by individual actuaries or their employers. But this research, as a general rule, while being valuable, is somewhat haphazard. How often have any of you been asked to "dig through the Transactions" to see whether anybody has reported anything on some particular assumption?

The effects of our current role of inertia are severe, not only to ourselves as working actuaries, but also in terms of the prestige of our organization, and our eventual credibility with the publics we serve.

The most immediate practical effect of the current situation, probably observed by all of us, is the lack of availability of data for us to set assumptions. This is particularly obvious in the area of Pensions, but it is not difficult to identify areas in other specialities where it would be very valuable to have up-to-date experience data available routinely.

Another major problem we have created for ourselves by the lack of a firmly directed research effort is that vacuums exist which are being filled by others. Research is being done in the actuarial field with varying degrees of quality. If the quality is high, there is no particular problem, other than the inevitable confusion which results about "why is this project being done by these people?"; unfortunately, studies of this type do not generally have labels attached to them indicating how good they are!

Objectives of Board Committee on Actuarial Research

I have probably exaggerated the deficiencies of current actuarial research a little. Nevertheless, the Board Committee does feel that it is essential for the Society to better organize, promote and manage actuarial research than has been done in the past, and we enthusiastically welcome the challenge. Our charge is to prepare a report for the full Board of Governors on the subject of actuarial research. In doing this, I would consider the Committee's objectives to be the following:

1. We will try to define what actuarial research is. (We have already pretty much agreed that it includes not only preparation of statistics, but also the pure research function. A major question is how far should this pure research function extend?)

2. We should see what is currently being done in the area of actuarial research, not only by the Society of Actuaries, but also by other actuarial organizations, consulting actuarial firms, and also non-actuarial individuals and groups.

3. We will attempt to make a list of what projects should be done, either by the Society or by others. Part of this objective would also probably include analysis of what is currently being done that could be revised, or even eliminated.

4. We will try to find out what is needed by our membership and by our publics.

5. We will investigate whether the projects that are currently being performed are being done in the proper place. Ideally, this investigation would also extend to projects we define as being needed for the future.

6. We intend to determine whether the projects desired are short term or long term, and assign various degrees of urgency to each. We will also study the possible costs of any changes in eventual policy towards research. This will include consideration of enlargement of staff personnel in the Society to perform such research; whether it is feasible to expect employers to subsidize research more extensively than in the past; and so on.

In order to make some headway in achieving all these objectives, we have done a little analysis ourselves, as a Committee. We expect to do much more in coming months. However, we believe that a large part of our efforts will be in obtaining input from others, both actuaries and non-actuaries. This panel

represents our first attempt to do this. Obviously, we will welcome input from members of the audience here, and Robin Leckie has already invited the membership to respond by means of a letter in The Actuary.

Hopefully, our own work, and the input of others, will provide us with enough information to come up with a reasonable proposal for the future research functions of the Society of Actuaries. It is going to be hard work, but I think the end result will be worthwhile.

Before I close, I would like to offer food for thought on a couple of issues that are of personal interest to me in this general area.

One is the question of whether research performed under the auspices of the Society of Actuaries should be influenced to any degree whatsoever by "employer" interests. Theoretically, I am convinced that it should not; in practice, it is a little harder to decide. Perhaps the decision as to "who does what" research project could be based on the idea: that work performed by the Society of Actuaries should be purely professional in nature, independent of industry or employer interests, and that such work would perform the foundation for other organizations to modify and adjust for "the real world". My concern is that, if the Society proclaims itself as a professional body, yet produces research which is to any degree serving of other interests, our usefulness as a scientific and professional organization could be seriously questioned.

My other idea is somewhat less profound, but perhaps worthy of at least passing consideration. How often do we read in the newspaper about doctor so-and-so who read a paper at a meeting of a medical association in which he reports discovery of a definite link between foodstuff A and cause of death B, based on the results of a mortality study? These articles always seem to get a great deal more publicity than the results of the Society of Actuaries' mortality studies. They also have considerably less validity in many cases, I am sure. Sometimes, a couple of days later, someone else will question the validity of the study, but of course that report is buried in the back pages of the newspaper, and meanwhile, everyone is busy avoiding foodstuff A! Why should not the Society offer its services as a "review body" for mortality studies of this type? Or at least, could we not get more active in an analysis of the study methodology and the results once they are published? Something like this would, I think, be a very good and visible way for actuaries to better serve the public.

MR. JOHN C. WOODDY: My comments on actuarial research are somewhat fragmentary and disjointed, which, I fear, is all too accurate a reflection of the state of actuarial research at the present time.

For many years the profession has collected and published data on mortality and morbidity, with analytical interpretations of the significance of overall changes from one year to another. This activity is essential. How could actuaries leave this hallmark of our profession to others? At the same time, the studies are almost entirely confined to mean values, the variations - over time, among companies, etc. - receive little in the way of detailed attention. I feel strongly that the data used for present studies of mean values should be collected, compiled and maintained in such form as would permit study of variations in experience.

Actuaries in Canada and the United States are not into economics to any great extent. By contrast, in the United Kingdom many investment managers are actuaries. Some work has been done here relating experience under disability income policies to economic conditions. Also studies have been directed at the problem of investing assets so that funds will be available when needed, i.e., immunization. But comprehensive study of the economics of uncertainty in a North American context has not, to my knowledge, been undertaken. A key element, at least in connection with individual life insurance, is competition, which tends to be ignored in developing assumptions underlying many investigations. How important is it that the true probability of death may vary substantially from one life to another in the same cell?

Mathematical papers are written on some of the fundamental theoretical elements actuaries deal with. I should like to see more cases where a problem is seeking a theory and fewer where a theory is seeking a problem. I had an interesting conversation at the recent ASTIN Colloquium with Harold Bohman, who has written extensively on ruin theory. He asked me what the causes of actual insurance company insolvencies have been. In the United States in the past ten to fifteen years we have had a significant number of failures of both life and non-life companies. We thus have a large amount of data for studies of, say, causes of insurance company insolvency, or stages along the road to failure. Here is a prime subject for actuarial research whose results would be of intense interest to many people.

There are some encouraging developments in connection with actuarial research. In the first place, I believe that there is increasing cooperation: (a) between members of the Casualty Actuarial Society and members of the Society of Actuaries; (b) across national boundaries. Secondly, there is funding available for research projects. The Actuarial Education and Research Fund was set up to provide help, generally on a pre-funding basis. The David Garrick Halmstad Prize, to be awarded annually beginning in 1979, amounts to an inducement to undertake an ambitious piece of work for which pre-funding may be either unavailable or inappropriate. The Research Committee is to screen research papers and submit recommendations to an award committee which will make the final selection.

In spite of these encouraging aspects, I feel that, overall, actuarial research receives too little attention. For one thing, there is no consensus among actuaries as to the problems on which research would likely prove valuable. We see accountants expending considerable time, money, and effort on research and thereby expanding the scope of their activities, sometimes at our expense. We do not have much idea of either a course or a destination for research efforts. I might suggest that perhaps the first step toward enhancing the position of research in actuarial esteem is to educate more members of our profession to the fact that we are in the risk business. Some risk enterprises may also be risky; but the two terms are not at all synonymous.

In view of the heavy work load on most actuaries, I feel that the voluntary system of getting work done on behalf of the profession as a whole has about reached its limits. I believe that we actuaries must be prepared to pay higher dues in order to increase the number of professional actuaries working on actuarial (as opposed to administrative) jobs for the Society and the profession.

I think that establishment of a Board committee is a step in the right direction. Success, however, will depend upon developing an appreciation in the general membership of the importance of actuarial research and its potential impact on the profession - and, conversely, the dangers of neglecting research.

MR. KENNETH T. CLARK: Robin today assigned me the task to "outline how the Society might work with other actuarial organizations in a reorganized profession". There is a double implication here: first, that we are organized and second, that we are going to be reorganized. There are those among us who are skeptical of the first and apprehensive of the latter.

We have to begin, therefore, with the obvious alternative of doing nothing. Actuaries talk a lot about assuming risk and it is unfortunate that one risk that we are too often eager to assume is the risk of inaction. And it must be admitted that there are advantages to un-unified actuarial research. It leaves each group free to concentrate on its own needs. Thus, the Casualty Actuarial Society can study the rate at which teenage drivers wrap cars around telephone poles in downstate Connecticut, and the Society of Actuaries can study major medical expense claim costs in the hospitals to which the ambulance takes them after the accident.

One has to wonder whether some of the good research now going on would be undertaken by an "umbrella" organization. Let me give you two examples from my home base, the Canadian Institute of Actuaries. A few years ago, the Institute made a special study of ordinary insurance mortality in the Caribbean. Canadian actuaries have a long-standing interest in Caribbean experience and this study was useful to them. The second example is that the Institute has for some time made regular studies of sex-distinct group life insurance mortality rates. Would these studies have been made by a larger, unified profession?

Notwithstanding the advantage of the status quo, I believe that our professional research is well described by the old prayer: "We have left undone those things which ought to have been done, and we have done those things which we ought not to have done". I see five advantages which might be derived from research in a reorganized profession.

First, most obvious, and least important, is the avoidance of duplication of effort.

Second, is a bigger budget, but I do not rate that as a large advantage.

The third advantage -- and this is an opinion rather than a fact -- is that a reorganized profession provides a better framework at the policy-making level for cost-effective research. Frankly, I do not see how it could be any worse than the present framework, where we measure neither the costs nor the effectiveness of our research. The failure to measure costs is a serious one. Ironically, it results from the overwhelming reliance on the voluntary efforts of our membership, which is one of the great glories of our profession. In this respect we would be better off if our research relied more on out-of-pocket expenses. In accordance with the old adage, "Give an actuary an inch, and he'll measure it", we would force ourselves to think about the actual cost of our research.

As to studying the effectiveness of our research, I find our present practice to be a clear-cut case of substituting impressions for demonstrations.

The fourth advantage of research in a reorganized profession is that we can learn from each other. The Society's regular studies rely on contributions of experience data. This is probably the greatest problem in the Society's studies; it is difficult on the insurance side and virtually impossible on the pension side. On the other hand, our confreres in the Casualty Actuarial Society have found, whether by good fortune or good management, the solution to this problem.

The fifth advantage is that research in a reorganized profession will have a broader sponsorship. The public will more likely view research as professional research, rather than as self-serving research of the insurance industry or the private pension game.

MR. THOMAS R. HUBER: Many members of the Society are probably not fully aware of the magnitude of the studies that are done periodically and in some case each year by the Society of Actuaries' Committee on Mortality and Morbidity Experience Studies. For individual insurance studies there are three committees: the Committee on Ordinary Insurance and Annuities, the Committee on Health Insurance, and the Committee on Aviation and Hazardous Sports. For group insurance studies there are also three committees: the Committee on Life and Health Insurance, the Committee on Annuities, and the Committee on Self-Administered Retirement Plans.

These committees are staffed and run by strictly volunteer members of the Society. No one is paid by the Society for his or her services, which when you come to think about it is quite a remarkable thing. There are currently as few as four Society members on one of these committees and as many as 18 on another. The "Year Book" states that these Committees collect and process experience data in their respective fields for presentation to the Society, usually in the annual Reports Number of the Transactions.

For those who are willing to do the necessary reading, the annual Reports Number is usually crammed full of interesting and useful data ranging from studies on Group Long-Term Disability Insurance to statistics on Hazardous Sports. To give you an idea of the amount of research your Committees are doing, let me list the type of studies my committee is producing. And remember that my committee is just one of the six regular Society Experience Study committees.

This year in the 1977 Reports Number, the Committee on Ordinary Insurance and Annuities published (1) the annual study of Mortality under Standard Ordinary Insurance Issues, and (2) a study of Experience under Accidental Death Benefit Provisions in Ordinary Insurance Policies. Next year in addition to the annual mortality study, we expect to publish (1) a Study of Disability Waiver of Premium Experience, (2) a Study of Mortality under Immediate Annuities, Life Income Settlements and Matured Deferred Annuities, (3) a study of Standard Ordinary Mortality by Cause of Death, and (4) a study of Mortality under Substandard policies. Also work will begin in 1979 on (1) a study of Mortality and Lapse under Term Conversions and Guaranteed Insurability Options, (2) a study of Mortality and Lapse under Group Conversions, and (3) a Study of Mortality under Policies for Large Amounts. Thus there is never a dull moment for your Society's Experience Study Committees; most or all of them are very active, producing huge volumes of data, and hopefully the quality of work is at least as great as the quantity.

Besides these six regular Experience Study Committees, the Society from time to time appoints a special committee to prepare something special, like a new valuation mortality table. There are currently two such special committees (1) the Committee to Recommend New Mortality Tables for Valuation of Ordinary Policies - better known as the New CSO Table Committee, and (2) the Committee to Recommend New Disability Tables for Valuation. These special committees work very closely with the Society's regular committees because the underlying data for a valuation table usually comes directly from the data in the reports of the regular committee. Sometimes, instead of an entire Committee being appointed, a Society member will develop a new valuation table and then write a paper describing it. Two recent examples of this are the 1971 Individual Annuity Mortality Table and the 1971 Group Annuity Mortality Table.

The Society also maintains a liaison with many other research organizations. Currently, the Society's Liaison Committee with the Association of Life Insurance Medical Directors, for example, is extremely active. This Liaison Committee is comprised of three FSA's and three life insurance company Medical Directors and is currently working on four different studies: (1) An Atrial Fibrillation Mortality Study, (2) a New Mortality Monograph, (3) a New Medical Impairment Study, and (4) a New Build and Blood Pressure Study.

As a matter of fact, some of the preliminary results from the New Build and Blood Pressure Study were presented at one of the Concurrent Sessions this morning.

As a Chairman of one experience study committee and as Co-chairman of one of the liaison committees, I have found that my most difficult problem is not at all in getting FSA's or ASA's to volunteer their time and effort, but to get insurance companies to consent to lend us their electronic data processing facilities for the compiling of our various studies. This has been true even though individual companies are reimbursed by the Society for their computer time, programming costs, and clerical expenses (even though the companies are not reimbursed for the time their FSA's or ASA's spend on the studies). Perhaps the time is coming when the Society would be better off having its own computer facilities for all or much of its research work.

To sum up, it is clear to me that the Society's Experience Study Committees manned completely by volunteers are doing a terrific job in supplying the experience data needed by our membership although, of course, there is always room for improvement and expansion.

MR. RICHARD W. ZIOCK: I would like to make you familiar with what the Committee on Research is doing these days. We have 12 members. The Committee on Research was set up by Ed Lew, a very prominent researcher himself, about 13 years ago. The objective of the Committee on Research is to foster and encourage research. We try to get actual researchers on our Committee, but we take other people as well and there has been a trend in recent years to try to increase the number of company actuaries versus academic actuaries.

I would like to draw on the distinction made by Daphne Bartlett between pure as opposed to statistical research. As I think she meant the distinction, we have little role to play in the mortality studies and statistical things like that. Our prime function from the beginning has been pure research. One of the biggest things we have done is to hold a 2½ day conference every

year on some subject of interest to research-minded actuaries. Generally speaking, the idea in the earlier years was to bring some area of academic research which is fairly well developed to the attention of actuaries. Of those 2½ days we generally had 1½ days of presentations by the academics of some university, who are experts in the particular sub-topic. They give their views and then the last day or day and a half we have papers by actuaries. We have had 13 conferences so far: the most recent ones have covered Multivariate Analysis, Modelling Financial Markets and Life Contingencies. The last one had a special emphasis on treatment of time to death as a random variable. A special feature of the Conference was a panel by the new authors for the new book on Life Contingencies. This particular conference departed somewhat from the usual format. We did not have any academic specialists outside the actuarial profession - we had about 15 or 16 actuarial papers presented by actuaries.

These conferences have been very successful. I think anyone who has attended them will agree with me.

Now, some of the other things we do. When Dave Halmstad was a prominent member on the Committee on Research about 5 years ago, we started publishing ARCH - Actuarial Research Clearing House, and Dave was the main force behind that and it has been quite successful. I think we are up to around 400 subscribers now. After Dave's death it did not do too well for a while, but we have revived it now and are back on a publishing schedule of twice a year. It is being distributed by the Society of Actuaries. This is a publication that is intended to be an informal way for researchers to communicate their results to other researchers and get their views on them. We have an active correspondence - letters back and forth between people following papers presented there - and that is a very valuable addition to those doing research. It is actively subscribed to by European actuaries as well as North American actuaries and there are a few Casualty actuaries interested in it as well. The emphasis is more on Risk Theory and Mathematical Aspects than on the statistical topics that have been mentioned.

Also the Committee on Research prepares reading lists and we review papers that are toss-ups by the Committee on Papers. They cannot decide and so they ask us for an additional opinion.

The general tenor here has been that we need to do more research and I can certainly agree that the profession could do more. However, I do wish to point out that the 12 people who are on the Committee on Research are doing at present quite a bit with all that activity. I do not see how we ourselves could undertake a great deal more.

MR. M. STANLEY HUGHEY: * The Actuarial Education and Research Fund - AERF as most of us refer to it - grew out of the kind of discussions that are taking place here, except these took place 6 to 8 years ago in their original stages and 3 to 4 years ago in their more final stages. We recognized the need for research, the problems of getting it under way, and more particularly

* Mr. Hughey, not a member of the Society, is a Fellow of the Casualty Actuarial Society, Chairman of the Actuarial Education and Research Fund and is Executive Vice President of the Kemper Insurance Companies.

the need for funds to finance research where a gracious company or consulting firm for various reasons was not willing to support an individual who was trying to do a particular piece of work. Out of that understanding came the agreement to start the Actuarial Education and Research Fund. This is a 501(c)(3) organization which means simply that it is a tax-exempt fund or foundation and that all contributions to it from U.S. citizens are tax deductible. The idea is to provide a means of building funds with the purpose of advancing the knowledge of actuarial science, responding to the needs of the public for education and research in actuarial science. The purpose is to provide money for research studies, educational programs, or whatever seems appropriate to build up the research concept.

AERF is a catalyst with the intent of bringing together a project, some worthwhile research activity that needs to be done; the researcher, a person who is qualified to do that work; and the fund that is donated by either individuals or organizations interested in having this research done. Management is vested in 12 directors, members from each of the 6 actuarial sponsoring bodies.

We have undertaken several projects but we are still learning. We are not sure that we are doing everything right, and if you have some suggestions for us, we would like to know about them.

We serve as a depository for award funds. The Halmstad Fund currently has approximately $5,000, which will be used to make an award each year.

We are working on several special projects. We have found a need for a book on loss distribution. This is important in the Casualty field and also in the health line for excess loss calculations. We are sending out requests for proposals on this project, and I'm happy to report that we have over $15,000 in funding commitments. There is a great deal of interest in this particular activity and we anticipate no real problem in collecting whatever funds we need in getting this textbook written, printed and available.

The Committee on Valuation and Related Problems has called our attention to a need for a study on capital and surplus needs, both of life companies and also casualty companies. We are working out a proposal on funding and we think we can develop some interest if we can get the proposal going.

We have other interesting projects under way. One concerns the Public Employee Retirement System. Using AERF as a vehicle, with a task force to do the work, a proposal was made to the National Science Foundation, who were going to pay for this. We were strictly a catalyst in this situation. The proposal, for the moment at least, has been turned away, but we are hoping to again develop some interest in it.

Another proposal concerns a study of universal coverage as it applies to Social Security. Again we are being used as a catalyst with a task force being proposed to do the work.

On our financing, the Halmstad Fund has been mentioned. AERF has received $5,000 in royalties from the Trowbridge-Farr Pension Textbook. Each of the societies has made some contributions. We are operating on modest funds and we are at the point where there are important needs and additional funds are going to be needed to keep this as an on-going program. It is our hope and intent to somewhere along the line get out a plea for individual contributions from members of all the societies.

There are many projects which simply are not practical on a voluntary basis, and by having some money available we believe that we can provide a useful vehicle for funding these activities. It is the AERF Board's assignment to develop and administer these funds. Any help towards achieving our goals will be very much appreciated.

MRS. ANNA M. RAPPAPORT: I have been asked to approach this topic from the viewpoint of the consultant. Consultants work with all types of security products, and with financing arrangements which include guarantees and insurance, and with financing arrangements which include no such guarantees. I will assume that the interests of plan participants and beneficiaries are always important to the consultant, although the legal responsibility in this regard varies. The examples I will use will be based on pension plans.

Consultants work in firms employing from one to nearly 200 actuaries. The library facilities which are available in their firms range from excellent to little more than a set of Transactions. All consultants are limited in the amount of research which can be undertaken unless it applies to current and immediate client problems.

It has been stated that the Society is becoming a public profession, and in my opinion, the expansion of consulting practice is one aspect of that development. As a profession we must be concerned with service of the public. As a professional organization devoted to education and research, we must be devoted to public service both by serving our members well and by providing direct public service.

I wish to set forth for you two points in my discussion:

1. The Society should be assuming a much more aggressive and broader role in actuarial research, and in providing information services to members

2. The research available to pension actuaries through Society sources fails to address many of the key areas which will determine whether the systems operate on a sound financial basis, and whether they will meet participants' needs over time. It appears that we have failed to look at the system in operation, identify critical areas, and address our attention to providing information that will help our profession in those areas.

On the first point, the Society has an on-going and successful program of experience studies in order to collect data on mortality and morbidity experience. It also publishes papers. It has no other on-going research program. The Society should expand its program of research so as to become a key source of data and information for members and the public. Some of the areas of expansion are:

1. Experience studies of other variables affecting security systems

2. Research on implications of demographic trends on security systems

3. Research on implications on family patterns on security systems

4. Research on economic matters affecting security systems

5. Development of new tools which can be used by actuaries

6. Searching out of information which can expand the horizons of the profession.

Together with research, the Society should provide a first class library and information service. It should aggressively disseminate its research results. It should have available to members and the public a comprehensive library of mortality and morbidity research whether done by actuaries, public health statisticians, the government, demographers or others.

This type of aggressive role in approaching research and information services will help the Society and the actuarial profession achieve higher levels of public credibility, and will help the members of the Society serve the public and their clients well.

My second point, we need to address security systems in operation in order to determine the key areas which need attention, and then focus our attention on them. Actuaries are concerned with the mathematics of evaluating risks, and with the financial soundness of and satisfactory operation of systems for providing security. Using pensions as an example, this leads up to several questions:

- What are the most important factors in determining the level of contributions required in a pension plan?

- Do our experience studies support the selection of the most critical variables?

- Are the systems designed in such a way as to meet the current and future needs of the participants?

I share with you several observations relative to these points. First, the three most important actuarial assumptions in funding of a pay-related pension benefit are investment return, salary scale assumption, and rate of turnover. Yet, the Society has never done any research or experience studies designed to help in the choice of any of these assumptions.

Second, our society is changing, and the change in individual living patterns, retirement ages, and the total demographic picture will be of vital importance in the satisfactory operation of our pension plans and retirement systems over the lifetimes of our current plan participants. The Society has never addressed these issues, and, in fact, some actuaries consider them "non-actuarial". At this meeting I am presenting a paper dealing with some of these issues. However, I should point out that the paper is on a subject which at one time was not considered suitable. We need to look closely at the systems which we work with, and to define from a broad viewpoint the areas which concern us as actuaries.

The third issue in connection with pensions is that actuaries have concerned themselves with the funding of specific plans, but not as a Society with the overall satisfactory operation of the security system and its soundness. Today, there is a great deal of attention focused on this question because of concerns about public plans. In the future, our profession must be more concerned that security systems are operating well and serving the needs of plan participants, and we must do research to support those concerns. If we are not

concerned, and if the systems fail, the fact that the failures did not result from poor actuarial practice will hardly save us, and will hardly save the system in which sound plans can operate.

I hope that this panel will be the beginning of a new attitude to research, and of a new focus of expanded research services.

MR. EDWARD A. LEW: I would hazard the guess that the future of the profession depends largely on a sustained effort to push the frontiers of actuarial science forward, if only because continued inflation is likely to diminish the role of permanent life insurance in the actuarial scheme of things. Accordingly, we should try to encompass the much wider range of risks that confront people today, develop better arrangements for shifting risks through insurance or otherwise, and participate more actively in providing improved instruments for savings needed to take care of future contingencies.

The profession has not been truly research-minded for many reasons.

For one, the life insurance business as a whole has not been very innovative in recent years. This is in sharp contrast to the achievements of some fifty years ago when scientific underwriting was evolved, a wide variety of plans and benefits (notably disability benefits) was introduced, and the basic forms of group life insurance, group annuities and credit life insurance emerged.

Of course the growing complexity of business operations has in recent years compelled actuaries to concentrate on the immediate concerns of their employers, as exemplified by the mountains of work on G.A.A.P. and E.R.I.S.A. Then, too, a great deal of time has had to be given to the organizational problems of the profession arising from the existence of disparate actuarial bodies. This has necessarily relegated the issues bearing on the long-range prospects of the profession to a lower priority.

A basic handicap to more imaginative actuarial thinking lies in the nature of the actuarial syllabus, which contains a number of rather narrow topics, such as reinstatements and changes. Even when bona fide research questions are raised, the answers tend to be circumscribed by considerations of immediate utility. For instance, the Society's mortality and morbidity committees have performed extremely well in providing information for rate-making and underwriting, but have not looked more intensively into the reasons for changes in death and sickness rates. Whereas in the early decades of this century, actuaries were justly seen as having the last word on mortality and morbidity, the government and the public turn today to demographers, biostatisticians and physicians engaged in medical research for insights on death and illness. We have had no successors to Gompertz, Makeham, Hardy, Elderton and Hunter. Nor have actuaries recently written books comparable in depth to J. B. MacLean's "Life Insurance" or for that matter fundamental texts on pensions, at least not until Charles L. Trowbridge lifted his pen on the subject.

Most importantly, perhaps, the Continuing Education and Research Committees have not lived up to the expectations entertained for them. Some have produced only reading lists and but a few have come up with a modicum of innovative thinking. I attribute this failure to lack of leadership and direction. I would urge the Board of Governors to indicate explicitly the areas of their concern and set specific research goals for the various Education and Research Committees.

Among my priorities would be research into coverages for new types of risks - other than life insurance and pensions - and research into the nature of the fluctuations in investments used for funding life insurance and pensions.

If the private sector does not offer insurance or other risk-shifting arrangements, such as cost plus contracts and forward contracts, the government is likely to step in. The history of health insurance and of catastrophe insurance testifies loudly on this point. I would like to see the Society of Actuaries join with the Casualty Actuarial Society to define insurable and non-insurable losses, explore the kinds of information and the constraints needed to render losses insurable, and more generally address themselves to risk situations, such as are commonly found in business, that might reasonably be evaluated in probability terms. Those who call themselves risk managers are waiting in the wings to try to do just this.

I feel even more strongly that the Society of Actuaries should establish several investment experience committees to trace the course of the financial risks involved in funding life insurance and pensions. The firm of Dreher and Rogers has made an enviable start on such research. Considering that investment losses and inflation are now the principal factors affecting the pricing and stability of permanent life insurance and pensions, it is rather strange that the Society of Actuaries has not undertaken any research in this area. The record of investment experts and economists over the past fifteen years has been such as to leave a great deal of scope for American and Canadian actuaries to contribute some solid thinking in this field.

For it is a matter of fact that British and French actuaries have long excelled in the investment of life insurance and pension funds. In Britain, the Actuaries Index is the equivalent of the Dow Jones, and many actuaries are employed on the stock exchange. In France, a high proportion of actuaries deal with financial risks, and the current president of the French Society of Actuaries is a banker as well as an actuary.

The time is ripe for the Board of Governors to take command of the priorities in actuarial research and direct appropriate committees to pursue specific goals. It should be made clear that research means a systematic effort to obtain new knowledge and understanding, and not merely a review of literature of interest in related fields, expansion of data bases, or development of tables, formulas and procedures to comply with government regulations. Only the Board can chart a course that will enable the coming generation of actuaries to reach out further and function as a more broadly oriented, responsive and stronger profession.

MR. DANIEL F. CASE: I think it is important not to confine our attention to research which is directed toward meeting recognized "concerns" or "requirements" of actuaries. I can think of three types of research which might appropriately be undertaken. One is research directed toward actuaries' recognized needs. The second is research for which no need has been clearly identified. The third type might be considered as meeting "unneeds". It is research which many actuaries feel, at the time the research is begun, is likely to have an adverse effect on the narrow interests of their employers (or their own career interests, if they are self-employed). Perhaps the true test of our professional mettle will be whether we are willing to do research of this third type.

Those are my principal thoughts. On another aspect of our discussion, it occurs to me that if we want actuaries to do more research (as opposed to contracting research out to non-actuaries), perhaps our educational program needs to include more about research methods.

MRS. RAPPAPORT: Very often one of our problems is that we should be concerned about something and we do not realize it: the problem has not surfaced in our own minds.

If we had a first-class information service for our members, we should track what is being done and we should tell our members about it.

MR. DAVIS H. ROENISCH: I identified three types of research from the comments of the Board and my own thinking. One, on which I will not comment, is pure research. The second is information gathering and the Society can do a great deal more of that. Let me cite some examples of necessary information that the Society could gather but has not.

For example, the Bankers Trust Company gathers information on what kind of final average pension formulae are being used, what kind of cost-of-living adjustments, what early retirement actuarial adjustments, valuation of assets.

The importance here is that this is an information-gathering procedure. The Society should actively promote this, because in dealing with Government, you find the people who are passing regulations are starved for information. They do not know what is going on in practice as a general rule and consequently they are inclined to make misjudgments. I think gathering information is one of the functions that seems to me self-evident and should be studied.

The third aspect is the applied research, and here I have been disappointed in the Society's reaction. For example, a few years ago while developing "generally accepted actuarial principles", committees were set up to review various principles. One of their conclusions was that "better accepted practice would be the explicit recognition of inflation". The committee came out with their declaration but they showed no support for their conclusion by way of any investigation or mathematical demonstration of why they thought explicit recognition of inflation would be the preferred practice. Consequently I suggest that one of the things the research committee could do would be to list very practical questions that are coming up in the profession that are causing difficulty. Once identified they should set up research groups to try and develop information which would lead to meaningful resolution of these issues.

MR. ZIOCK: The job of the Committee on Research is to promote and foster research, not to actually do it. That must come from AERF or somewhere else like that.

We have had complaints in the past that our work is too esoteric and not understandable. We have tried to overcome this, while still maintaining high standards aimed towards theoretical work. We now include more company actuaries and recently we have studied subjects of more interest to the ordinary actuary: for example the last conference was on Life Contingencies. Even then, few company actuaries turned up, and I think our role cannot go too far towards the practical end.

MR. BRUCE E. NICKERSON: I would like to challenge what I perceive to be a presumption of some of the other speakers with regard to the way other professions handle research and the comparison with the actuarial profession.

We are, as most people in most professions are, practitioners for the most part. The information-gathering function, which is so well done by our committees, lends itself to function by committee.

The second type of research has now been referred to as "pure research". Considering that we are primarily a small profession of practitioners, I am amazed by the volume and the high quality of that type of work: the number of contributors to ARCH and the things that they put in. I doubt that we can expect much more; perhaps better coordination, but not much more in terms of volume.

Now, where is this research being done in other professions? Research for the most part is very closely associated with the educational function: or else with governmental funding, which I would be reluctant to recommend we plunge heavily into. Medical research is being done at the medical schools; law research concentrated in the law journals associated with the law schools. We are unique in that we are totally doing our own education.

In other words, the conclusion that I draw is that we are not likely to get more "pure research" until educational institutions become a more important factor in the development of prospective members of the profession.

The third type of research has been referred to as applied research. It might be better categorized as "standard setting". Many of us have observed certain reports in which the overall standard of actuarial practice does not meet what we expect in quality. The whole area of actuarial standards is being reviewed by a committee of actuaries who don't really have the opportunity for doing the degree of research that is necessary. Research in that area, to support the standard setting, is perhaps the most difficult challenge that we can toss to the Board of Governors.

MR. ZIOCK: A large amount of research is funded by the Universities. At public universities, the actuaries who teach actuarial curriculum spend as much as half of their time doing research. One of the members of our Committee recently made a survey of the work being done and there was a wide response, although many people commented on the difficulties of funding the research.

MS. MARIA N. THOMSON: My comments on this subject fall into two categories. First, much of the data which is currently being collected would be of great use to me if it were presented in a more accessible form. Second, there are some studies I would like to see, which do not currently exist.

Addressing the first point, I find many of the studies hard to interpret. I have difficulties in locating the detailed description of what a given study means, and in interpreting the description once I have found it. Also, the descriptions are sometimes incomplete.

After I have figured out what the numbers mean, I often discover that they are in a form I can't use, or can only use with difficulty. This criticism is most applicable to health insurance. Data is often presented for policies with specific sets of benefit combinations. However, insurance companies

market such a wide variety of health benefits, that it is not unusual to find that no study meets your needs. What is required is data for each variable, with a formula for combining the variables. I think the Major Medical studies, such as the one presented by Paul Barnhart in TSA XXI, is an excellent example of this concept. Actually, the approach used here was to provide data for basic benefits, and then to provide formulae for adjusting for benefit variations. Some sort of expansion on this idea for disability and hospital indemnity plans would be welcome.

I would like to give another example of data which could be presented in a more useful form. Currently, disability studies are done for, at most, two broad occupational classifications. Occupation has such a significant effect on disability rates, that a more useful approach would be to develop factors for a broader and more refined set of occupational classifications, which could be applied directly to claim costs.

In general, I think more imaginative approaches could be used in presenting the Reports data in a practical form. These practical forms might lead to rough approximations - but that is better than total guesswork due to unuseable data.

Moving to my second issue - the studies I would like to see, that don't exist - my company is in the direct response business, i.e., mass marketing and professional association. We are currently starved for data in this area, as the experience falls somewhere in-between that for traditional individual and group plans. Direct response has become a significant marketing form in the insurance field, and is rapidly expanding. Thus, it seems appropriate to develop special studies for this business.

MR. HUBER: As Chairman of the Committee on Ordinary Mortality, I agree that we sometimes fall into a rut and believe that what we produce is of the best quality and usefulness. At a recent committee meeting we discussed this problem and considered certain changes that should be made in our reports, but there are sometimes high costs involved in making changes to computer programs.

MRS. RAPPAPORT: Several members have suggested that there may not be much more that we can do, but I do not think we have a choice.

This is our future and we must comment on the changes that are taking place in society. We must show that we can make a contribution and that our profession will continue to be valuable in the future. I think we must become accustomed to contributing more money to the research function if it is needed.

MR. ARNOLD F. SHAPIRO: I have heard discussion about pure research and practical research. To me that is not very meaningful: all research is research. It does not matter whether you are collecting data or testing some formula that might be useful. One of the problems I do find, however, is that I do not know what people want done. If there is some particular type of research that you as a practitioner would like to see done, how do I find out about it? One of the vehicles that we need is some sort of publication, perhaps in The Actuary, that would say "Here is the type of research we would like to see done", preferably outlining some basis for funding.

I would not like to see projects farmed out. We have good people, both in industry and in universities and before we farm anything out I want to be sure that we cannot do it in-house.

MR. COURTLAND C. SMITH: A recent criticism of the way existing research results are reported in the Transactions Reports brings into focus some of the problems in this kind of discussion. We are talking about communications problems, how we present results. Perhaps we should show results for single variables at a time, and combinations of variables. There is a difference in the way life actuaries have proceeded from the way casualty actuaries have proceeded and statisticians generally. Many years ago, life actuaries who were studying mortality and certain other areas began to recognize that there were inter-relationships in variables that required that the results be shown conjointly. Things were not so simple that you could take single variables and then introduce adjustments the way casualty actuaries often do. You do have inter-relationships that have to be taken into account.

Mr. GEOFFREY CROFTS:

We are a group of practitioners. Ours is a professional field and as such we draw on knowledge from whatever source we can get it. The medical profession draws its scientific knowledge from biology, zoology, botany, physiology, many of the scientific fields; and so should we.

There is work being done on inflation and interest rates, that we should be tapping into; and new studies on mortality theory. But we can draw on these things: we should be looking into them. Other kinds of research require massive costs, but with some ingenuity and some other kinds of research you can get a lot of this information. It takes people with a certain amount of ability and time to even do that.

MR. ROBERT J. JOHANSEN: Question 4 is aimed at the division of actuarial research among the Society, other actuarial organizations and universities. There is, however, another area where research of an actuarial nature is being undertaken and discussed - the statistical associations.

As liaison representative of the Society of Actuaries to the American Statistical Association (of which I am a member), I have attended several recent joint annual meetings of statisticians. At each of these meetings I noted that a number of sessions dealt with actuarial subjects, including survival studies and, most recently, the pricing of auto insurance. In many of these discussions reference was made to "actuarial methods", which generally turn out to be exposure formulas, life tables, and forms of the Gompertz and Makeham formulas. The researchers, however, often develop other formulas and other approaches, and frequently design mathematical models to assist them in their analyses. Measurement of reliability of findings and conclusions has been a prime consideration, particularly where samples are small or follow-up is incomplete or curtailed. Some of their results are considerably advanced, as shown by several of the papers presented at the 1978 meeting.

For example, a paper on kidney graft survival developed a Makeham model of the form $ae^{-ct}+\delta$ using a negative exponential in order to recognize that the rate of graft failure decreased rapidly with time. (Note the similarity with group conversion mortality). A paper on competing risk analysis offered a general formula to analyze the interaction of death rates from

different causes acting simultaneously in order to derive the probability of survival if one cause of death is eliminated. The use of log linear models to analyze frequencies of an occurrence among groups of persons traced over a specified length of time was also presented.

A paper on obesity took issue with life insurance studies as not being sufficiently useful because such studies fail to take body frame size and build into account. The study measured obesity by the skinfold method and included physical examinations, medical and laboratory tests, and diet questionnaires. The assertion was made that a distinction could be made between overweight persons who were obese and those who were not.

There was also a session on auto insurance pricing which included analyses of premium rates vs. experience rates in Massachusetts, suggestions for new ways of pricing different risk classes, and a paper analyzing the development of surplus in the property and liability insurance industry. The latter came to the not unexpected conclusion that investment risk was at least equally as important as underwriting.

I think that both actuaries and statisticians could benefit by an interchange of ideas, results of studies, methodology, and the like. While arranging a joint meeting of some sort might be some time away, I would like to suggest that, meanwhile, actuaries with an interest in these various fields take a look at what the statisticans are doing.