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**PRICE DISCLOSURE AND COST COMPARISON**

1. What constitutes adequate price disclosure? Should it include more than the typical information as to premiums, dividends, and nonforfeiture values? For example, should it cover commissions and/or other selling costs?
2. How does the public benefit from cost comparison indexes and shoppers' guides? What are the dangers in their use, and how can this best be minimized? What has been the practical experience to date with (a) Wisconsin disclosure regulation and (b) Pennsylvania shoppers' guides?
3. What are the characteristics of an ideal cost comparison index? Which, if any, of the various indexes proposed to date best fit these characteristics? In selecting a particular index for use, what compromise should be made between simplicity and technical accuracy?
4. Some of the cost comparison methods treat a whole life policy as a combination of decreasing term insurance and increasing savings account. What are the implications of this?
5. What are the advantages and disadvantages of concentrating (whether by regulation or otherwise) on a single type of cost comparison index? Can one type of index adequately serve all purposes?
6. What would be the long-range implications of increased price disclosure and cost competition? For example, what impact would they have on such items as actuarial cost assumptions, profit or surplus margins, and product design?
7. To date, most public discussion of life insurance cost comparisons seems to have centered around regulators and marketing personnel. Should actuaries play a larger role in such discussions? If so, what can they do to shed light rather than heat on the subject?

*St. Paul Regional Meeting*

CHAIRMAN ROBERT N. HOUSER: The idea of using cost indexes is something that has not sprung up overnight. I remember that one of my first actuarial jobs was trying to help agents in cost competition. Of course, the type of cost index then was the traditional cost index. Comparative cost lists and shoppers' guides are not anything new, either. Net cost comparisons were published annually in *Life Insurance Courant* (Flitcraft Publications) and by Best's. When *Best's Life News* and *Life Insurance Courant* were merged in 1969, the study continued in the new magazine *Best's Review*. In these comparisons ten- and twenty-year net costs and net payments were shown and even ranked. The only difference was that this was within the industry instead of outside. I can very well

remember companies getting permission to reprint from the Best's magazine and peddling Best's lists in profusion.

The recognition and criticism of fallacies of the traditional net cost method are apparent in an article which appeared in the *Journal of the American Statistical Association* in 1940, written by a professor at Duke University.

Current confusion over the cost of the popular ordinary or straight life insurance policy is largely due to the fact that the latter is a hybrid between expense and investment . . . . The "net cost" is simply a difference between all sums paid to the company and the amount returnable at the expiration of a given period. It may be computed for all forms of contracts, whether participating or non-participating (in case of the latter, no allowance need be made for dividends); it may be a résumé of past experience ("actual history") or a forecast according to the current premium, dividend scale, and cash value ("prospective"). Whatever the case, the "net cost" is a gross understatement of the cost of protection because it makes no allowance for (1) interest foregone in an alternative investment and (2) protection lost because of an increase in the reserve.

MR. DONALD B. MAIER: Most of the recent concern over price disclosure is based on all or some of the following premises:

1. Adequate price information has not been made available to the public.
2. People have been paying higher prices for their insurance protection than they would pay if they had access to proper cost information.
3. Many people purchase permanent insurance when they can and should purchase a significantly greater amount of term insurance for the same premium outlay.
4. People would shop more intelligently if certain index figures reflecting actuarial-type factors (interest, mortality, lapse) were made available to the public.
5. As a result of the increased price competition brought about by revealing these index figures, insurance companies would be forced to cut costs and profits.

I doubt the validity of these assumptions. In the vast majority of cases an agent sells life insurance on the basis of his evaluation of the needs of the prospect rather than as a result of a person's deciding that he needs insurance and then shopping for the best buy. I do not believe that providing the public with cost indexes, however calculated, will have a significant effect on the type of insurance purchased or the average cost of insurance. It could well have the opposite effect if states decide independently, as is threatened in New Hampshire, that elaborate cost information is in the public's best interest and each state promulgates

its own complex regulation. This would obviously force insurance costs upward.

I believe that most prospects currently receive information completely adequate for their purposes from their agents at the time they are approached. I believe that most agents are professional enough to describe adequately the benefits included in most policies and accurately inform the prospect of the premium rate. Illustrative dividend information is generally readily available in those cases in which a prospect would like to have some idea of the magnitude of the dividends and in which the size of the policy justifies the preparation of such data.

Much publicity and discussion have been created by consumer advocates and others who claim a lack of readily available cost information. This situation cannot be ignored and must be dealt with. Yet it is my opinion that there is no particular underlying "grass roots" demand for additional cost information, and the vast majority of the insurance-buying public would be none the worse for the lack of it.

What undoubtedly is missing is an understanding on the part of the public of the basic concepts of life insurance. This, it seems to me, is the area where the effort should be concentrated.

What constitutes adequate price disclosure? The answer to this question varies with the customer. Too many prospects will lack the background, the willingness, or the ability to attempt to comprehend the apparent complexities of life insurance. Many lower-income prospects will be seeking modest amounts of basic protection within the limits of their finances, and elaborate cost and dividend information cannot be justified by the amount of insurance and premium involved. Such groups must rely almost exclusively on the ability of a competent agent to describe the life insurance benefits which are best in a particular case. I believe that in these areas the public must rely on the integrity of the insurance industry and the state insurance departments' regulatory powers to protect their interests.

Where a prospect has a somewhat better understanding of life insurance and, in addition, is seeking a somewhat more comprehensive insurance program which would justify the preparation of additional data, more information should be provided. Such a person may find it useful to have ledger statement data showing premiums, illustrative dividends, and cash values. This information will enable a prospect to judge his cash outlay from year to year, as well as the total over the first ten or twenty years. By examining premiums less dividends during the better part of twenty years, and the trend in such figures, he can obtain a rough idea of ultimate net payments. Interest-adjusted cost figures or

other more elaborate cost indexes generally would be of little use unless the prospect also had available to him similar figures for a like policy. Even then the usefulness of such figures will depend on the prospect's ability to understand what he has. Except for the interest-adjusted figures, I find it hard to believe that very many would make the effort or be able to evaluate the significance of cost indexes or to understand their limitations. There is little doubt in my mind that the salesman with the more convincing story and interpretation of such figures, whether he understands them or not, will make the sale.

It can be argued that more sophisticated prospects who are in the market for relatively large amounts of insurance should be provided with more elaborate data. Such prospects presumably would make the effort or seek competent advice to interpret more complex data, and the size of the purchase would justify the cost of preparing the data. But what should these data be? If one has schedules showing premiums, cash values, and, on participating policies, illustrated dividends, what more does an intelligent prospect need? Actuaries are, we hope, the most sophisticated prospects for insurance one can find. What cost data would you want in addition to the data available in ledger statements? I think that I could handle interest-adjusted figures for making comparisons, and I think that that is about the limit of complexity that would be meaningful in 99.9 per cent of real sales situations.

If one has tables of benefits, premiums, cash values, and dividends, he can make just about any cost comparison he might want to make, whether the policies are "like" or not, participating or nonparticipating. A reasonably intelligent prospect can look at going-in costs in the early years and mentally relate the cost to the amount of benefit in a particular year. A particular benefit in a particular year should take on whatever value a particular person feels it is worth. If he feels that there is a good chance he will surrender after twenty years, then the level of cash values at this point becomes important. If he feels that his income is limited now but has real potential for future growth, then the lower initial price of term insurance is important. Realizing that dividends are not guaranteed, he can mentally assign less importance to higher illustrated dividends in later years, and so forth.

Should additional information, such as the agents' commissions or selling costs, perhaps the salaries of the company's top ten officers, or maybe the latest Schedule Q margin be provided?

I simply do not see the need for information of this sort. The real question for the purchaser is, "What is the cost of the package of benefits that is appropriate for my needs?" Moreover, I doubt that a prospect has any

right to expect to be provided with this other information. In addition, it is hard to imagine how such information can be evaluated intelligently. I am no expert on agency compensation, but I am sure that there are many different ways of transmitting the same number of dollars to the salesman, so that particular commission rates will not be very meaningful. I doubt that one could find two companies which would define "selling costs" in the same way. What is important to the policyholder is the benefits he receives—including cash values, settlement options, loan provisions, and the like, all of which are set forth in his policy and should be explained by a competent agent—and the price he pays (his premiums less dividends, if any).

In summary, I doubt the basic premises on which most of this discussion is based—that sufficient cost data are not available to insurance prospects; that, if sufficient data somehow were provided, people would make different, more intelligent decisions in purchasing life insurance; and that life insurance costs would decrease because of increased cost competition. With the possible exception of interest-adjusted cost data in appropriate cases, I feel that completely adequate price information is usually provided through schedules of benefits, including cash values, premiums, and illustrated dividends. I feel that such data can be expected to be more useful as one moves into larger or more sophisticated insurance programs. Purchasers of smaller policies, or those who are unwilling or unable to understand basic life insurance concepts, must rely almost exclusively on the advice of competent salesmen, and it is the obligation of the insurance industry and the various insurance departments to ensure that such purchasers are not taken advantage of. I feel that there is a real need to educate the public in the basic concepts of life insurance, what types of policies and benefits are available, and how one can intelligently choose an insurance program for his particular needs. I believe that the time and effort of consumer advocates, senate investigating committees, insurance departments, and actuaries which is being spent on this seemingly endless debate on price disclosure and the advantages and disadvantages of the various theoretical approaches would benefit the insurance-buying public to a much greater degree if it were spent developing educational materials and articles on what life insurance is really all about.

MR. PAUL D. YEARY: Mr. Maier listed five premises which he believes have led to recent concern over price disclosure. He then stated that he doubted the validity of the premises. I think that the premise that "people have been paying higher prices for their insurance protection

than they would pay if they had access to proper cost information” and the one stating that “as a result of the increased price competition brought about by revealing these index figures, insurance companies would be forced to cut costs and profits” are true. I believe many companies will re-examine their philosophies on what constitutes “adequate surplus” and will try to improve their competitive positions.

Mr. Maier also stated, “A reasonably intelligent prospect can look at going-in costs in the early years and mentally relate the cost to the amount of benefit in a particular year.” I have to admit that I cannot do this, and, if this were a true statement, I do not believe we would be having this session.

MR. JERRY MCKOSKEY: I would first like to make a couple of statements in defense of the interest-adjusted method. Millions of life insurance sales have been made utilizing traditional net surrendered cost figures. The blue-collar worker, with no appreciation of the value of interest, is led to believe that his “cost” over a twenty-year period will be a negative \$3 per \$1,000 per year. He can hardly wait to sign the application. I have met many agents who believe sincerely in this misconception themselves and are thus well equipped to sell it to a prospect. I do not believe that we really want to see insurance sold on this basis. If the interest-adjusted surrendered cost, with all its limitations, was required by statute to be presented at every sales interview, this general misconception would be substantially eliminated.

While it is true that most prospects today do not understand what is meant by “interest-adjusted cost,” this should not prevent us from introducing the concept to the public and promoting its general use. As people are exposed to it through magazine articles, sales interviews, perhaps government, industry, or consumerist information bureaus, and so on, I believe that general public understanding will be achieved. People generally did not understand finance charges and interest rates when Truth in Lending was introduced; since its passage, however, public awareness has increased considerably. Responsible industry people must work toward better insurance education of the public, and requiring the use of interest-adjusted cost is a good place to start.

MR. ARCHIE R. McCracken: In trying to define what constitutes an ideal cost comparison index, I prefer to think first about an index that might be used for comparing essentially similar policies. Each of you can decide for himself just what is meant by the words “essentially similar.” However, we might have two different level premium participating whole

life policies with different premiums, different cash values, different paid-up and extended term values, and differing current scale dividend illustrations. An ideal cost comparison index must give a sound answer to the question, "Which of these policies gives better value to the average life insurance buyer of level premium participating whole life policies?"

In addition, the ideal index must be sufficiently simple in concept that its meaning can be understood reasonably well by representatives and by most clients. This point may be argued by those who have developed or tend to favor some of the more sophisticated methods. However, I cannot believe that a figure that is not understood in at least a general way will be widely accepted as a good measure of value just because someone says it is one. Most of us have a poor understanding of the details of the consumer price index, but we understand generally that it is a kind of average of consumer prices, and, as such, we accept it.

The two criteria that I have described have been referred to as "musts." I would add a couple of "shoulds." The index should be reasonably easy to calculate, and it should neither exaggerate nor minimize true cost differentials.

Mr. Ryall, in his paper, and others have discussed indexes for comparing dissimilar policies. I suppose a truly ideal index would be one that could be used for such purposes. My own view is that this is really another field, that there is no significant demand for such an index, and that we should not even be suggesting that an ideal index for such comparisons might exist.

I do not profess to be at all familiar with all of the indexes that have been proposed. However, I know of only two that I would describe as sufficiently simple in concept to be reasonably well understood by representatives and most clients. These are the traditional method and the interest-adjusted method as described in the May, 1970, report of the Joint Special Committee on Life Insurance Costs. They are both sufficiently simple in concept to be reasonably easily understood, and they are both reasonably easy to calculate.

If we use the traditional method to compare our two level premium participating whole life contracts, we find that the one with higher premiums will tend to show a lower net cost. We will also find that the one with the steeper dividend scale over the period used will tend to show the lower net cost. These weaknesses of the traditional method are, in my opinion, sufficiently serious that I could not say that the method produces a sound answer to the question, "Which of the policies gives better value?" However, these weaknesses are largely eliminated in the interest-adjusted method.

On the question of neither exaggerating nor minimizing true cost differential, I believe that the traditional method is again deficient. One of the members of our legislative assembly in Ontario recently attempted a public comparison of some life insurance policies using net cost figures he had found by the traditional method. I have forgotten his figures, but the principle was that for a particular policy Company A showed a net cost of 2 cents per \$1,000 per year, and for an essentially similar policy Company B showed a net cost of \$2 per \$1,000 per year. He blissfully concluded that Company B's policy was 100 times more expensive than Company A's. Use of the interest-adjusted method would have avoided such a conclusion.

In my opinion, if you want to use an index, the interest-adjusted method is probably more satisfactory than any of the other proposals with which I am familiar. It is not an ideal index; it is not very profound, and it would be hard to make a career out of talking about it. However, I do not think that an ideal index will ever be developed, and we in the industry need offer no apologies for that.

I really do not expect that an ideal index is going to be developed to tell me whether I will get better value from a Ford or a General Motors car, and such an index might well be of more significant value to more people than a cost comparison index for life insurance policies.

The question is asked, "What compromise should be made between simplicity and technical accuracy?" To me, that might be a tougher question if I could define "technical accuracy" with respect to a cost comparison index. Having formed my criteria in terms of that fictitious average man who has 0.9 wives and 2.3 children, who terminates a portion of his policy each due date, and who dies a little each year, I find it very difficult to become highly enthusiastic about what some might call technical accuracy. We must meet reasonably our criterion of a sound answer to the best-value question, but in my view the criterion of understandability is imperative if our index is to have any hope of general acceptance.

Question 4 of the program outline refers to the concept of looking at a whole life policy as a combination of decreasing term insurance and an increasing savings account. Whether or not this is a reasonable way of looking at a whole life policy leads to unending theoretical arguments that always seem to me to be about as productive as the chicken and egg argument. One does find some very surprising statements concerning this artificial division. For example, Senator Hart, in his opening remarks at the hearings of his Antitrust and Monopoly Subcommittee, stated, "As the years went on, insurance companies devised the level premium

method which added a 'savings' element to the insurance on death protection. The companies thought the idea would have consumer appeal and would protect against the companies ending up with only the worst risks." No mention is made of protecting the policyholder from ending up with prohibitive premiums. Later Senator Hart said, "Thus, the vast majority of consumers today are putting a part into savings and a part toward death protection when they plunk down that premium—but no one is telling them how much goes into each category. I suggest it is time someone did." I wonder whether the Senator would like his automobile manufacturer to tell him how much he pays for all the metal parts of his car and how much he pays for all the other parts.

Cost comparison indexes have been developed around the separation concept. I dislike the thought of getting into an argument about their theoretical niceties. However, I have not been persuaded that indexes built up in this way provide any sounder answer to the question of which policy gives better value. Certainly, on the score of understandability and ease of calculation they fall far short of being ideal.

Question 5 refers to the advantages and disadvantages of concentrating on a single type of cost comparison index. If an index must be used, then there are arguments that no single index can serve adequately all purposes. Parenthetically, there are arguments that no single index can serve adequately any purpose. There are life insurance buyers who are quite certain for example, that they want level whole life coverage and are not interested in cash values. An index that gives significant weight to cash value may not be a suitable index for such a buyer. For a highly substandard buyer the twenty-year net cost figure may be rather hypothetical. Another disadvantage of using a single type of index is that it is likely to convey the thought to both representatives and clients that it has much more significance than is justified. This would be particularly true if showing of the index were required by legislation or regulation. If a buyer is shown one index indicating that Company A is better for a particular plan and age, and another index indicating that Company B is better, then he is likely to be convinced that he should be looking at something more than an index.

On the other hand, this element of confusion of the buyer that might result from the use of more than one type of index is more properly an argument in favor of a single type. Presenting several indexes is probably no more a satisfactory answer to the consumerist than saying, "Look at the premium and year-by-year values and dividends." The consumerist is, in effect, saying that it is too difficult for the average buyer to look at the more extensive array of premium, value, and dividend figures and make

logical comparisons. He wants a capsule figure of some kind. I doubt that he will be satisfied by having the consumer given different capsules that might lead to conflicting conclusions. Can you visualize a situation in which the representative of one company argues that for your purposes index A is the type you should look at, and the agent of another company, for whatever reason, argues that index B is more suitable? It is hard to imagine that such a situation would satisfy anyone. Furthermore, the added cost to be borne ultimately by policyholders if companies were required to be ready to provide a variety of indexes seems quite unjustified.

We have no alternative, in my opinion, other than to stress that, if the client wants to look at a cost index, a single, uniform type should be shown. I believe that we made a serious mistake in not agreeing some years ago that the traditional net cost index had weaknesses too serious to be accepted and that when the Joint Committee proposed a replacement for it, we did not accept that replacement. If we had agreed, it might have been possible to keep the whole question of an index in proper perspective. To argue that something that is not perfect should not be used is at least tenable, but to argue that something much less perfect should continue to be used is not. We have dug a very awkward hole for ourselves, and the longer we flounder around in it, the bigger it gets.

As the only Canadian representative on the panel, I might say that we have not solved the problem in our country. As a matter of fact, we did not know that we had a problem until you in the United States told us about it. Unfortunately some of our would-be consumerists were listening too, and we are hearing increasing noises. My personal hope is that we can quietly replace the traditional net cost index, to the extent that it is used, by the interest-adjusted index and by so doing keep the whole question of indexes in reasonable perspective.

MR. ROY R. ANDERSON: The interest-adjusted method is clearly superior to the old net cost method. However, even the interest-adjusted method can do a serious injustice to nonparticipating policies when they are compared with participating policies, if the index is based on a duration of more than ten years. This is because the factor of survivorship is not reflected in the interest-adjusted method. With the interest-adjusted index, there is no way in which the costs for a nonparticipating policy can be compared fairly with those of a participating policy at the twentieth-year duration. The injustice is particularly severe when a *ranking* of the policies of companies is made, based on the interest-adjusted method for the twentieth-year duration, as was the case with Pennsyl-

vania's *Shoppers' Guide* of April, 1972. This might be inferred from the following facts:

1. Of the costs illustrated in the *Shoppers' Guide* for the policies of fifty companies, forty-two were for participating policies and eight were for nonparticipating policies. The eight nonparticipating policies were all ranked in the last ten places.
2. Of the fifty companies that were ranked, eleven were stock companies that issued both participating and nonparticipating policies. In all eleven cases the data shown were for their participating policies. (For each of the eleven companies, their twenty-year interest-adjusted cost was higher for their nonparticipating policies than it was for their participating policies, but this was not the case for the tenth-year duration.)

Hopefully, no other insurance department or other governmental body will issue a ranking of companies based on interest-adjusted costs. However, if such a ranking is to be made, a far more realistic comparison would be made by using the tenth-year duration. This produces a fairer comparison between participating and nonparticipating policies because the effect of the persistency factor tends to be equalized. Roughly one-half of all policies persist ten years.

MR. YEARY: The second question begins, "How does the public benefit from cost comparison indexes and shoppers' guides?" I feel that the following benefits are possible.

1. If an applicant really wants to try to understand insurance and its relative costs from company to company, additional input is available to him.
2. An awareness that policies which are equal in benefits will probably not be equal in cost will exist in some additional percentage of the public, simply through casual exposure to the news media and their coverage of shoppers' guides, Senate hearings, and so on.
3. Cost competition will undoubtedly increase, leading to a better deal for at least some of the consumers.

The second question also asks, "What are the dangers in [the use of cost comparisons and shoppers' guides], and how can this best be minimized?" All the fine print and carefully worded paragraphs in the world are not going to keep a cost index from being a dominant factor in a competitive situation where it is reasonably well understood. How can Agent A convince a prospect that his company gives better service, is stronger financially, tries to provide needed insurance to a broader social spectrum, does not nitpick on claims, etc., etc., if Agent B says it just is not so? All the items going for Agent A's company could lead to the difference in whether coverage will actually exist for the prospect in a given claim situation, yet truth cannot be demonstrated. What this boils

down to is that perhaps the consumer will be given a sanctioned tool (the index) to clear the fog by making the wrong decision. I am not sure that this danger can be minimized.

Shoppers' guides, Senate hearings, and the like, have made insurance experts out of journalists. Some of the misinformation being provided by the press is appalling. Consider the Scripps-Howard headline in the February 19, 1973, *Cincinnati Post*: "Is Your Policy Real Insurance?" Here is a passage, quoted in full to avoid using the punchline out of context: "Five companies, New York Life, Equitable Life, John Hancock, Prudential and Metropolitan Life had \$97 billion in assets. That's the lion's share of the \$222 billion in assets held by all 1,805 life insurance companies in the country. [Here is the punchline, all in the same paragraph:] The life insurance industry has outperformed the Dow-Jones Stock Index two to one in the last five years."

File that one away for your "buy term and invest the difference" crowd. Another gem appeared in the Portland Oregon Journal on March 22, 1973: "The customer seldom sees dividends. Normally, they go into his policy's 'cash value' where they accrue at interest and help reduce the company's liability in case of claim." If anyone here has information on this dividend option, see me.

How can problems like this be minimized? Someone needs to organize methods of response to those supplying sensational and erroneous information to the public through the news media. Possibly letters to the editor, interviews with the reporters (perhaps they would welcome another headline), requests for equal time, and so on, could be undertaken on a systematic basis by some organization, such as the Society.

An over-all index for a company is impossible to achieve. For example, the policy that gets the number one Denenberg ranking requires that the applicant be in "first class physical condition with a favorable personal history." Western-Southern's plan covers up to 140 per cent mortality at age 20, 130 per cent at age 35, and 125 per cent at age 50.

Denenberg's averaging of three "average yearly costs of insurance" seems to have serious limitations, since too much weight is given the age 50 average yearly cost. I became concerned about the influence of age 50 when I decided to do some sample calculations raising the excess interest portion of our dividend formula by 2 per cent. Here are the results: At age 20, where our writings cluster, with 37.1 per cent of our paid-for issue between ages 15 and 21, we moved from 43d to a tie for 20th. At age 35 we moved from 43d to 27th. At age 50 we moved from 42d to 34th (1.5 per cent of our issue is at age 46 and above). In the composite

ranking, we moved from 42d to 34th, the same number of places we moved in the age 50 ranking and fifteen places less than we moved at age 20. I think that we are going to see some great celebrations of individuals' fiftieth birthdays, with the masses at the lower ages chipping in a few cents each so that those few who wish to purchase insurance in the higher age ranges can get a better break. It surely is a practical way to improve your Denenberg standing until everyone figures this out.

How can this misuse of the indexes be avoided? Preparers of indexes must be objective when criticisms are received. Problems should be removed when pointed out. Simple averaging of indexes should be recognized as having as severe flaws, for a given consumer, as the traditional net cost method does in some instances.

To the extent that cost indexes and shoppers' guides are believed to be successful, there will be pressure to reduce insurance costs to the point of possible danger. Adequate surplus will be redefined, as perhaps it should be. There will be great temptations to call on surplus from existing blocks of business to help subsidize new low costs with the hope that experience emerging will somehow reflect our optimism more than our past experience. Younger companies will be in a real squeeze because they have not developed surplus margins to utilize in financing low costs. This may lead to fewer companies competing. Dividend scales may be stretched, leading to valid complaints about dividend illustrations being meaningless. There may be more frequent decreases in dividend scales, and these may tend to occur in the older blocks of business. General pride in never paying less than the amount illustrated may be swallowed in attempts to produce acceptable gains (or to stave off losses) in surplus.

How can this problem be minimized? We as actuaries will have to be persuasive, equitable, and realistic in our establishing of rates and dividends.

Shoppers' guides need to be published frequently, if at all, so that up-to-date information is available. This works both ways. A company deserves credit for its progress, which it cannot get when its competitors use an outdated guide. On the other hand, an improved product could be shown as ranking very high, because of the improvements, when compared with the latest (but very old) index, when in truth many of the other companies also have improved. From another point of view, some companies may never undo the damage in some people's minds that has been done by the first rating, even if they improve their position substantially.

How can this be minimized? The authors of shoppers' guides must

understand that they have a responsibility to publish frequently updated versions or to make it clear that outdated guides are unreliable. This is especially true if the guide is published by a governmental organization.

Many states seem to want their own indexes. Pennsylvania's proposal and Wisconsin's regulation are fairly close together. Arkansas's proposal is to use your own dividend accumulation rate. New Hampshire's proposal is to use 6 per cent to accumulate dividends. Multiple variations are a real problem.

How can this be minimized? Suppose that the traditional net cost method had never existed and some legislative body required that a cost comparison method be designed. I can imagine it going like this:

1. Legislators, agency men, and others would invent our traditional net cost method.
2. Many actuaries would find several things wrong with the proposal and introduce lapse rates, death rates, interest, and the like.
3. The actuary who has to deal eyeball to eyeball with the advocates of the traditional net cost method would settle on the interest-adjusted method as having a slim chance against those advocating an easily understood method. He would consider it a great victory if he prevailed.

The insurance industry needs to close ranks in favor of the interest-adjusted cost index. This index has gained wide enough support to be considered a true improvement. At worst, it is a lesser evil.

Moving on to the topic of practical experience with the Wisconsin disclosure regulation, let me share a letter with you from our only district in Wisconsin (i.e., a 100 per cent sample).

In regard to our telephone conversation of May 8, 1973 concerning the questions you had extended to me. . . .

*Question:* What percentage of applicants request the index during the sales interview?

A thorough review of our Agency force indicates practically none.

*Question:* What percentage of the new Policyholders ask questions about the index when they receive the form with the new policy?

The answer would be a very small percentage. The best calculation we have would be 2%.

*Question:* If any, are questions easily answered to the satisfaction of the Policyholder?

The answer would be, not readily. Even after questions are answered, we note a degree of puzzlement although it was not admitted.

*Question:* What percentage of the applications taken are known to be in competition in regard to the index? Is there any indication whether sales have been gained or lost because of the index?

The answer to this would be that a close review indicated that, so far, none of the applications have been known to be in competition and we feel that the form has had no effect on the gain or loss of business.

*Question:* Is the index understandable to the average consumer?

In the few instances that we have experienced, we find the index is not understandable to the average consumer.

*Question:* Since the name of the index is Life Insurance Surrender Index, is there any chance that a consumer can be talked into believing the higher the index, the better the return?

We think there would be.

*Question:* Do you have any ideas or suggestions that would help with the index?

I firmly believe that we have to find a simpler method of illustration for the average layman.

Western-Southern's practical experience with the Pennsylvania *Shoppers' Guide* is that it appears to have definitely hurt sales and persistency in the state of Pennsylvania. For example, ordinary sales were down 2.3 per cent in Pennsylvania but were up 10.6 per cent in the company. The only other factor that we are aware of that helped contribute to the poor showing was the impact of Hurricane Agnes. Pennsylvania is one of our larger states, having ordinary paid-for of nearly \$80 million in 1972.

MR. RALPH E. EDWARDS: I doubt that the average actuary could or should play a substantial role in cost comparison discussions at the present time. Not being bound by the standards to which we must adhere, the critics of the industry do not hesitate to oversimplify or generalize, citing only those aspects of our business which support their arguments. Personal publicity seems to be their goal, and they are abetted by a communications industry which values distortions that are newsworthy over truth developed by reasoned analysis. When, eventually, the hue and cry starts dying down, it may be possible for actuaries to bring out the truth with all its complications. Meanwhile, the prospect is furnished one more subterfuge for resisting the agent's persuasion, and the industry is diverted from its principal task.

MR. BARTLEY L. MUNSON: You have all received a notice with the Society mailing on these later spring meetings regarding the appointment of an Ad Hoc Committee on Truth in Life Insurance. In it our charge from the Executive Committee was quoted, namely, to recommend to them whether or not the Society or a committee of the Society should express an opinion on one or more of the areas being investigated by Senator Hart's subcommittee—if not, to state why not, and if so, to

stipulate in what area, by whom and to whom, and how the Society should organize to prepare that opinion.

The charge, I believe we all recognize, is not limited to a consideration of the cost disclosure/cost comparison subject being discussed here; not surprisingly, however, our committee's discussions and thoughts have centered primarily on that subject.

During the past couple of months, since our committee was formed, the National Association of Insurance Commissioners Task Force on Life Insurance Cost Comparisons has been very active in considering this subject, in an effort to propose a model regulation on this subject at the NAIC meeting the first week in June. Currently there is a draft of their recommendation, which will be reviewed at a meeting in Chicago next week. That draft recommends that the interest-adjusted method be adopted by the various states at least as an interim step, subject to the results of ten enumerated research projects. According to this draft, the NAIC would invite several organizations to participate in and assume responsibility for certain research projects. The Society of Actuaries, in the draft, is asked to undertake three items: an analysis of the various cost disclosure/cost comparison methods that have been suggested by various individuals and groups; an analysis of the propriety of interest, mortality, and lapse assumptions, if any, in such methods; and the philosophies and practices which might underlie dividend scales and thus relate to their usefulness in the objective of providing helpful cost disclosure/cost comparison information.

Presumably there will be some general agreement on the propriety of this initial draft when the NAIC task force and other interested persons meet next week in Chicago. As a result of the subsequent NAIC meeting in Washington, it is likely, in my opinion, that the Society of Actuaries will be asked by the NAIC to do some research, generally as I have indicated here. It will then be the Ad Hoc Committee's role to report on this to the Executive Committee, and it is reasonable to expect that we will make some type of recommendation to them at that time concerning future action. As of today, I believe it is fair to say that our committee would be inclined to recommend that the Society agree to undertake some reasonable research efforts in this regard. We have prepared no such recommendation, of course, and what we will recommend will have to await at least the developments of the next couple of weeks. Of course, it would be entirely up to the Executive Committee to determine the appropriate action regarding any recommendation we would make and to indicate what, if any, Society action should be taken.

One point should be mentioned that, from a research point of view, does tie together the proposed NAIC recommendation and the Hart subcommittee activities. That is the data bank that Senator Hart and his staff have accumulated, and may choose to add to, by questionnaire. The NAIC-drafted proposal envisions that the Hart data bank will be available for calculations and analyses in order to accomplish some of the research projects in their proposal. Should the Society eventually be engaged in research regarding the various cost disclosure/cost comparison methods, it probably would be with the use of that bank of statistical data.

I have enjoyed listening to the discussions here today and feel that they, together with comments previously made by Society members and comments which you may wish to share with us in the coming weeks, will help shape the eventual recommendation from our Ad Hoc Committee to the Executive Committee.

MR. MCKOSKEY: I would like to comment on Bart's question as to what role the actuary should play in the public discussion of life insurance cost comparison. Since I became a member of the Society, I have been disappointed in the Society's timid approach to expressing public opinions on questions falling within our area of professional expertise. To date, most public discussion of life insurance cost methods has come from insurance professors, regulators, and marketing people. Yet, in my opinion, no one is so well qualified in this area as the actuary. I would like to see the Society of Actuaries publish a position paper spelling out the pros and cons of the various proposed cost methods and, if the evidence warrants, supporting one or another of the methods. The Society of Actuaries, as a group, can make an impact that each of us individually cannot. I feel that we have a responsibility to the public and to our profession to make our opinions known on questions within our area of specialized knowledge. This is a responsibility of the Society of Actuaries.

MR. ANDERSON: The Society should not take a formal position on a question on which there is a legitimate difference of opinion among actuaries. There appears to be no practical way in which the viewpoint of the minority could be represented adequately. This problem is a very practical one in the situation in which a group of actuaries represents companies that comprise a minority in the marketplace. The issue of cost comparison is a good illustration. Among the leading companies in terms of volume of new-business sales, Allstate is among the minority that are stock companies that issue only nonparticipating policies.

*San Francisco Regional Meeting*

CHAIRMAN WALTER S. RUGLAND: The first part of our session is concerned with the questionnaire which you received as you entered the room. We would like to have you fill it out. It will be collected, and we will tabulate the answers and discuss them during the third part of our session.

The second part of our session is devoted to informal discussions of the paper "A Ratio of Interest-adjusted Cost Indexes for the Comparison of Dissimilar Life Insurance Contracts" by Mr. Peter L. J. Ryall. Formal discussions of this paper will appear with the paper in the *Transactions*. The third part of our session will be a discussion of the questions related to price disclosure and cost comparison.

MR. DALE R. GUSTAFSON: I will read a short commentary submitted by Mr. Peter L. J. Ryall on his paper "A Ratio of Interest-adjusted Cost Indexes for the Comparison of Dissimilar Life Insurance Contracts."

The approach to policyholder cost comparison in this paper is designed to meet objections raised by the Joint Special Committee on Life Insurance Costs in its 1970 report to certain recently developed, much-publicized methods. These methods stress separation of the policy into protection and savings elements; they require the policyholder to regard the cash value as a fair valuation of his interest in the policy. Furthermore, actuarial techniques involving probabilities of deaths and lapse, which customarily apply to large groups of lives, are in these methods misapplied to personal problems involving only one life. The method presented here is, in effect, a generalization of the interest-adjusted cost method, and the familiar interest-adjusted cost index is a measure of the cost of the net insurance benefit under a contract. If there is a significant difference in the net insurance benefit of two contracts, this should be taken into account. By using a control premium, based on a controlled scale of costs for the net insurance benefits, a control interest-adjusted cost index may be computed. If the Moorhead interest-adjusted cost indexes for two plans are in the same ratio as the corresponding two control indexes, then the prices charged may be regarded as equivalent. Now I twist the ratio about for the paper so that it is the ratio of the Moorhead index to the corresponding control index and thus is a measure of relative costs. The paper discusses how the prospect may most meaningfully be shown the relative cost of early surrender, since the ratio itself does not take that into account. There is an appendix showing how twenty-year ratios for standard plans can be quickly calculated by means of a seven-factor formula.

MR. BARTLEY L. MUNSON: For convenience I have broken my remarks down into eleven specific developments. The first five are really ancient history, starting back in 1968. Although they are not so current,

they do give perspective to what is going on this very week, and I think it is worthwhile just to check them off.

I would like to start with Senator Hart's speech in 1968 to the American Life Convention, in which he said that the industry had better find an improved way of comparing life insurance costs. He was prompted to suggest this because he was interested in finding some such comparison to aid returning veterans in their choice of policies when converting their servicemen's insurance.

The second specific development I point to was the industry committee, often referred to as the Moorhead committee—the Joint Special Committee on Life Insurance Costs—formed by the American Life Convention, the Life Insurance Association of America, and the Institute of Life Insurance. That committee was formed soon after Senator Hart's speech, and certainly that speech had quite a bit to do with its formation. The committee's findings, reported in May, 1970, endorsed the interest-adjusted cost method as being the most appropriate method among those studied by the committee. The report was received but not endorsed by the three bodies to whom this committee reported.

The third specific item was the creation of a task force by the NAIC. This occurred, I believe, in late 1971. First it was staffed by staff people from the various commissioners' offices, but it soon became apparent to the NAIC that it should be elevated to the commissioner level. That was done, and the five commissioners who served on it initially still serve today. They are Commissioner DuRose of Wisconsin, who is chairman of the task force, and Commissioners Rottman of Nevada, Weiss of West Virginia, Cotton of Texas, and Huff of Iowa.

The fourth development was some gentle nudging by Virginia Knauer, who is President Nixon's leader in the Office of Consumer Affairs. Early in 1972 she asked the industry what we were doing to implement the findings of the Joint Special Committee. An informal poll taken among the companies indicated that over seventy companies had given some information on the interest-adjusted method, at least to their agents. This satisfied Mrs. Knauer, I believe, for a few months. However, about the middle of last year, she gave a speech in which she urged the industry very strongly to initiate greater action on the subject.

As the fifth item of rather ancient history, I would allude to the NAIC task force meeting last fall in Sioux Falls, South Dakota. The task force met as part of the Zone 4 meeting, and many people were there to discuss this subject. They met subsequently, I believe, in Arlington Heights, Illinois, to talk about it with their consultants, namely, Bill Scheel and Joe Belth, and some members of the Joint Special Committee.

Now, under current headings, I will go on with the next five items and refer to the Hart hearings in February as the sixth. They were the hearings of the Senate Antitrust and Monopoly Subcommittee of the Committee on the Judiciary. This was a four-day Senate hearing where, primarily, critics of the industry were heard, and the subject of cost comparison and cost disclosure (two separate subjects, most of us feel, but closely related) received a great deal of attention. At that time the Senate subcommittee felt that it would have a second round of hearings, probably in May. They did not, and we will speculate in a moment about when the next set of hearings may be. They are not around the corner.

The seventh item is the rather significant two-day meeting that the NAIC task force called and held in St. Louis, April 26 and 27, just a little over a month ago. The meeting lasted roughly two days. There were about thirty-five people in attendance: people from the industry committee, the Institute of Life Insurance, and the NAIC task force, and others from the NAIC, including Commissioner Durkin from the state of New Hampshire, who is not on the task force but has been very interested and active in this subject in the past few months. Also, three advisers to the NAIC task force were present in that capacity: Messrs. Moorhead, Scheel, and Belth. The agenda was to consider the Belth retention method and his two-page disclosure information to the consumer as outlined in his consumer handbook. I think it is an accurate appraisal to say that the NAIC task force left St. Louis much less enamored of the Belth method than they were when they came.

The eighth point is the NAIC task force report that was actually drafted as a result of that St. Louis meeting. It has been discussed in Washington this week and will be up for adoption by the NAIC. It contains some proposed model regulations. It was drafted by Commissioner DuRose after the April meeting, with the assistance of several others, particularly with respect to the research projects which are listed at the end of that model regulation. It was discussed with industry people just last Wednesday in Chicago, when the ALIA committee and others were there to react to that draft, and it was retyped and made public, so to speak, just Sunday night.

As the ninth on our list of historical events—if we are keeping track of the list—I refer to Monday morning of this week, when Virginia Knauer had a press conference in Washington, D.C., in which she read a statement indicating that President Nixon praises the work of the NAIC, endorses their progress, and feels that there is a need for something like the interest-adjusted method. The press questioned her for about half an hour at the end of the conference.

The tenth item is the NAIC action that is going on this week. Some progress toward the adoption of the NAIC task force report and suggested model regulations is likely.

The last comment I have is simply one about the Hart hearings. We have been talking mostly about the NAIC in the last couple of months. The Hart hearings are not likely to be held for some time, although I do not want to go out on a limb and try to predict the date. The committee members do not want to come back to a second round of hearings until they have done some research. They would like to look at some facts. That might make some people uncomfortable, but then perhaps it should if the facts are such as to cause that discomfort. I think that Senator Hart does truly want to look at facts and will do some research, and have research done, before the second round of hearings. That suggests to me that the hearings will be next fall at the earliest.

MR. RUSSELL R. JENSEN: I think that adequate disclosure would be provided by presentation of the following information:

1. The basic life insurance premium.
2. A schedule of basic life insurance death benefits—usually just the face amount.
3. A schedule of additional benefits purchased by a separate premium, and the separate premium for those benefits.
4. The cash values available upon termination of the policy for each of the first five years, for the tenth and twentieth years, and at age 65.
5. Dividends for each of the first five years and for the tenth and twentieth years.
6. Total premium payments, less any dividends applied, for periods of ten and twenty years.
7. An illustration such as that provided in the conventional "ledger statement" showing what the policyholder pays, what the beneficiary receives at death, and what is recovered if the insurance must be terminated. This is an accounting format which is readily understood by most buyers.

One or more capsule indexes could be furnished also, on whatever basis is agreed upon, and currently that seems to be the interest-adjusted method. I do not regard this as essential to *disclosure*, which is concerned with adequate information about the insurance under consideration. These indexes are used for *comparison* of similar contracts and should be furnished to those who want the means of making comparisons. As public awareness of cost differences increases, the need for these indexes will increase, and they may become an integral part of disclosure. But I think we need to evolve to that point and to keep well in mind the ideas

contained in the final paragraphs of the May, 1970, report of the Joint Special Committee on Life Insurance Costs: "We reiterate for emphasis that this or any other cost index is not appropriate as a substitute for adequate information to the prospective buyer about the provisions of the policy and the patterns of premiums, cash values and dividends from which the cost index was calculated."

The report (see p. 19) was explicit in pointing out the information that was needed about policy values and other features. The buyer ought to know the premium, the cash values, the benefits, and the dividends, illustrated on the basis of current experience. To repeat, I believe that indexes are an adjunct to the basic information and are to be used for the purpose of comparing similar policies.

**MR. PAUL J. OVERBERG:** I shall first comment on what an adequate price disclosure should *not* show, and then I shall discuss what it should contain. It should not show the agent's commission. Showing the agent's commission would, in some instances, permit a consumer to make a more enlightened decision, as in choosing between two plans of insurance offered by one agent. However, there are a number of reasons why this information should not be given.

1. There is a strong possibility that some consumers will use the commission information as the sole base for their decision as to which of several policies is the best buy. Yet this will not assure him of getting the best buy.
2. The showing of the agent's commission could very well encourage many potential buyers to delay in purchasing the insurance protection they need. If the customer dies before buying, what good have we done for this consumer—or his widow?
3. Mail order business would undoubtedly tend to look better, yet it may not be the best buy.
4. Let us remember—life insurance must be sold; relatively little of it is bought. Without the agent, undoubtedly less life insurance would be sold. Is this the effect the consumerists want?
5. The practice would encourage rebating.
6. It would be harder to recruit and retain agents.
7. We should have a cost comparison method that measures the over-all costs; then, if any agents are overcompensated, this should appear in the over-all cost figures.

In the meantime, the demand for showing the agent's commission might be alleviated if the New York law were changed so that companies would not be discouraged from paying the same commission on term as they do on whole life.

In my next comments I will indicate what I believe constitutes adequate

price disclosure. Last Monday, Allstate announced at the NAIC meeting in Washington, D.C., a new program, which we call Allstate's fair cost disclosure plan. By now many of you may have heard of our announcement and may be familiar with some of the details. Since our new plan does cover the subject we are talking about, I will give a brief summary of the background of our plan and the plan itself.

For the past year we have been appearing at various NAIC and actuarial meetings and indicating what we believe constitutes adequate price disclosure. We have outlined several principles or guidelines that should be kept in mind in developing such a disclosure system. We believe that events will move swiftly in the next year or so. As Jack Moorhead said last Monday at the NAIC meeting, 1973 is a long way from 1970. We agree. We believe the time to act is now—and so we have. Basically, at the NAIC meeting, we discussed the “how,” the “what,” and the “when” of a price disclosure system.

The “how” is the interest-adjusted method with 4 per cent interest—with the hope that the interest rate will be uniform in all states yet with the recognition that the interest rates could change with a change in the economic conditions. The interest-adjusted method has its deficiencies. However, we know of no other method which produces cost information which is as practical, understandable, and acceptable as the interest-adjusted method. Therefore, we are endorsing this method.

The “what” of a fair cost disclosure plan is our firm belief that there is no single number or factor which can establish from the consumer's viewpoint the best buy among several life insurance policies. The several factors which we believe must be considered are the following:

First, the use of two cost indexes—the interest-adjusted average net payments as well as the average net cost. We refer to these two indexes as a death cost index and a surrender cost index. The use of the surrender cost index alone gives critics of our industry some ammunition to enforce their statement that the life insurance company confiscates your cash value when you die.

Second, cost indexes can vary considerably, depending on the period of time over which they are measured. Thus we believe that they should be shown for a minimum of two durations, the tenth and twentieth years, for both the death and the surrender cost indexes.

The third consideration involves making sure that the customer—and the consumer advocates—realize that no matter what type of formula is used to measure cost, no one can tell at the time the policy is sold which of two participating policies will prove to be the better buy. It is a fact that rankings based on dividends actually paid vary considerably from rankings based on illustrated dividends.

Please do not misinterpret my remarks concerning participating insurance. I am not condemning it. But, because most personal life insurance sold in the United States is participating, the industry must recognize the problem of comparing two participating policies and recognize the true nature of dividend illustrations. Let us be frank with the consumers—they will respect us for it. Dividend illustrations are not guaranteed, and any rankings based on dividends actually paid can vary considerably from the rankings based on the illustrated dividends.

It is becoming a widely accepted premise in all other areas of consumerism that the consumer has the right to know just what is guaranteed and what is not guaranteed. Applying this concept to life insurance would require that no cost index could be shown net after deducting illustrated dividends unless the comparable index was shown—with at least equal prominence—gross before deducting dividends. Some concern was expressed last Monday at the NAIC meeting that such an exhibition of cost indexes would lead the consumer to believe that there was a possibility, or I should say probability, that no dividends would be paid. I believe personally that with a proper explanation of dividends this should not be a major concern. Consumers long have been accustomed to interpreting guarantees. They understand that a ninety-day guarantee does not imply necessarily that the item will fall apart on the ninety-first day. But they do want to know whether the guarantee includes labor as well as parts, or just the parts.

That takes care of the “how” and the “what” of cost disclosure. Now let us look at the “when” of cost disclosure. The “when” of cost disclosure must be answered by each company in a manner which they believe can best give the required information to the customer. At Allstate we do not want the additional cost disclosure information to delay the consumer’s decision to buy the protection he needs. Yet we believe that the customer should have the opportunity to shop after he receives the cost disclosure information.

The foregoing factors led us to adopt the following cost disclosure plan for our personal life insurance customers. First, commencing this month, we will provide cost information at the time the policy is delivered on the interest-adjusted basis, giving both the death cost and the surrender cost indexes for both the tenth and the twentieth year and on the policies where such information is required under the current Wisconsin cost disclosure regulation. Within a few months, we will have our computers reprogrammed to provide this cost information on all policies of all sizes and all plans, including decreasing term insurance. Second, commencing this month, we will provide each and every customer with an unconditional

offer to refund his money if he returns the policy to the company or his agent within ten days after it is delivered to him. We feel that this is a reasonable, practical, and consumer-oriented approach to life insurance cost disclosure. We hope that our action may act as a catalyst for other insurers in this area.

**CHAIRMAN RUGLAND:** Let us have the first reports on the questionnaire.

**MR. MARTIN S. HUEY:** We had a total of sixty-two people fill out questionnaires. We did make an effort to tabulate responses to each question according to affiliation—consultant, mutual, stock, and others separately. However, I have concluded that not much variance is shown by the breakdown of responses by affiliation.

The first question was, "What constitutes a minimum level of adequate price disclosure for life insurance?" I interpret the results as follows: traditional ledger illustration plus interest-adjusted cost index values, 47 per cent; traditional ledger illustration only, 32 per cent; other approaches showing additional details, 18 per cent.

[Ed. note: The complete questionnaire with percentage breakdowns of the responses to the questionnaire is reprinted at the end of this discussion.]

**MR. GREGORY S. STRONG:** I am rather curious as to how Allstate came up with the ten-day period. Was it some kind of actuarial magic, or is there some reason for that figure? It does seem awfully fast, with the mail delay these days and the inherent communication problems. Perhaps with a company of your size you do not have the problems other companies have.

**MR. OVERBERG:** The ten days is an arbitrary number. It is picked up from the personal health insurance regulations which are effective in about thirty or more states; I believe there has been talk in the industry of ten days and, of course, State Mutual adopted the ten-day free look. In our case we say that it is ten days from the date the customer receives the policy. He receives the policy issued, and from that day he has ten days; we do virtually no business by mail. Our agents sell virtually all our business. The agent that sold the policy should be available, and, if he is not, his supervisor should be, so we do not think of ten days as being that short a period of time in which to accept or reject the policy. Incidentally, adding to the question that was asked earlier by the last gentleman, remember that we are on the risk sometimes for sixty days

before we deliver the policy, so ten days is about as far as we would want to go.

The characteristics of an ideal method of price disclosure are spelled out by Mr. C. L. Trowbridge in Appendix A of the Joint Special Committee report. There is one practical consideration that, while obvious, deserves repetition and re-emphasis. That is that cost disclosure is for the consumer. If this is kept in mind during the current discussions (among consumerists, regulators and in the industry), I am sure that whatever evolves will be beneficial to the industry as well as to the consumers.

Let us look at the question of splitting a life policy into its term and savings elements as an example of injecting the consumer's viewpoint into the current "great debate." Let us assume that a customer wishes to buy insurance protection for a ten-year period and wants to pay level annual premiums. He can purchase a ten-year term policy or a ten-year endowment policy. From a consumer's viewpoint the savings element in the ten-year endowment policy is obviously the difference in premiums between the two contracts.

If a customer wants thirty years of protection, and wants to pay level annual premiums, then he might choose between two policies: a thirty-year term with minimum cash values and a thirty-year endowment policy. Despite the fact that there are cash values in the thirty-year term contract, from a consumer's viewpoint it has no savings element. All of the premium is required to provide the thirty years of protection. The savings element in the thirty-year endowment is the difference in the premiums of the two contracts.

MR. JENSEN: Mr. C. L. Trowbridge summarized some theoretical and practical considerations of an ideal method of price illustrations; these appear on page 23 of the report. A point might be added, to reflect a caution, that the method should not be so constructed as to permit costs and benefits to be portrayed in a way that the index gives the appearance of values greater than actually exist.

Since it seems unlikely that all the desirable characteristics can be satisfied, we ought to do two things: (1) order our priorities so that we satisfy the most important first; (2) recognize that no one index or method necessarily will satisfy all situations and that while one may be favored or have more universal application, there will be situations in which other approaches are preferable to help the buyer in his analysis of cost and value of a policy.

My personal ordering of priorities would put simplicity and understandability in the forefront. Without this, the method will not be used or may be misused. Second, the method should be as applicable as pos-

sible generally, but it should always be recognized it cannot be universally applicable or solely relied on for comparison of two contracts. The other considerations would follow these.

Next, there is the question of "splitting the whole life policy into term plus a savings portion." This can be done in a number of ways, and that is part of the problem. With this kind of analysis we can arrive at an appraisal of the cost or value of one part of the policy only by making an assumption about the other part. This is inescapable, since the contract is a single entity. The facts are that the buyer pays the premium, the face amount is paid in the event of death, and the cash value is paid in the event of other termination. Any "split" is carried out by analogy and on the basis of the assumptions necessary to that split.

In my opinion, a "splitting" kind of analysis will not be helpful to most buyers. I think that buyers can understand readily and deal with a presentation of the policy values in a conventional accounting format, that is, a "ledger statement." In fact, I think they even deal in this way with the "time value of money," for they know the difference between a dollar of premium payable today and a dollar of dividend or cash value due some years from now. For those who wish to go further or need closer analysis, a cash flow with interest model will be helpful. Thus, for those who need and want it, there is the interest-adjusted index.

Can one type of index serve all purposes? The purpose of a cost comparison index is to compare the costs and some of the values of similar policies. I would prefer to maintain the distinction that cost is what you pay for something and value is what you get in return. The traditional method offsets against the cost (premium less any dividend) the cash value available on surrender. This is an offset of part of the value received in return for the cost, and the same is true for the interest-adjusted method. But no method really can account for all of the value of the policy. The buyer should consider premiums and benefits separately, whatever other analysis he may make.

**MR. OVERBERG:** The NAIC this week adopted a position that would outlaw the use of the traditional net cost method for all cost comparisons. This is in direct conflict with existing replacement regulations which require five-year summaries—ignoring the time value of money.

I suggest that a better alternative would have required the use of interest only for cost summaries which cover more than five policy years. Furthermore, cost summaries which cover more than five years should be permitted on a basis which ignores interest, as long as comparable summaries are given—at the same time—on an interest-adjusted basis.

MR. HUEY: The issue is the *practical* life insurance cost index. In response to our questionnaire, a significant portion (34 per cent) of the group indicated that they would be satisfied by an index which met the “ideal” criteria set forth by the Joint Committee with some allowance for the time value of money, but without any provision for the nonguarantee of dividends. Combining several categories, 39 per cent would prefer some allowance for the nonguarantee of dividends in conjunction with one or more other features. It is interesting to note that 15 per cent are satisfied solely by the ideal statement as contained in the committee publication.

Question III asks for a “nontechnical” description of a whole life policy. Most people (76 per cent) did not opt for the splitting of the policy but chose one of the “inseparable” options.

On Question IV—“Can one type of index adequately serve all purposes surrounding life insurance marketing?”—a resounding 82 per cent said no.

MR. STRONG: Perhaps I am being a little naïve, but if you give this only upon demand, is the buying public going to gain enough experience with this concept to make much use of it? It seems to me that you should go ahead and generate a publicity campaign—each company acting separately or some industry organization going out and really getting a lot of publicity for the concept. That could really help to educate the public so that they could make use of the information, and then we could supply it at all times and not only upon demand.

MR. MUNSON: Questions regarding the awareness of the consumers—whether or not they will ask for the index—are of interest to me. At the Virginia Knauer press conference Monday morning, after the three participants had had a presentation of about a half-hour, the press, when asking their questions, zeroed in on this problem. They said that Mrs. Knauer’s interest-adjusted figures are all very interesting, but the consumer does not know enough to ask for them. If they are not made available, what is going to happen? Mrs. Knauer advised that her office has a strong opinion that the consumer has to be taught to shop for life insurance and that the industry—as well as the regulators, the NAIC, and others—had better help the consumer do that. An analogy was drawn (although admittedly it was not perfect) between shopping for life insurance and shopping for groceries. Someday the two ought to be very similar as far as the consumer is concerned. Mrs. Knauer went on with this explanation at some length. Whether we like it or not, and I am not going to try to take sides at the moment, I think that five years from

now many more consumers will be shopping and will be aware that the numbers are available to them.

MR. DANIEL J. KUNESH: Mr. Jensen, are you opposed to providing cost index values and disclosure information with the presentation of the policy, and, if you are, why?

MR. JENSEN: This answer leads into the more general discussion of how the public benefits from cost comparison indexes and problems in the use of indexes. Generally, an index does not "disclose" but offers a capsule means of comparison. There have been references to indexes as "price," and the new NAIC model regulation requires that, when the interest-adjusted index is furnished, it is to be characterized as a "measure of the relative cost of protection of similar plans of insurance and other services rendered by the insurer and that a low index number represents a better value than a higher one." This alternative to the interpretation that the interest-adjusted method "takes time of payment into account" is described in an article by A. B. Nelsen in the March, 1972, issue of *The Actuary*. If I buy a permanent insurance policy and continue it over a period of time, certainly I will have to pay for the cost of protection and other services, and this cost will be reduced by interest earnings which the insurer is able to credit on reserves. Among other interpretations, it is possible to regard the interest-adjusted index as an attempt to offset the interest earnings on those reserves.

This index, or any other, is not the cost. We have to continue to emphasize to the buyer that he must look at policies in terms of their premiums, benefits, cash values, and so on. If he wants to go on and make comparisons, he may use the index, and it should be furnished.

All indexes have inherent limitations and require qualifications. The consumer's interest will not be served if indexes become a substitute for actual cost and values of the policy or if they are not related to the purpose of over-all comparisons of similar policies.

In some of the first publications and usage of the interest-adjusted method, these limitations and qualifications were overlooked. That, plus the difficulty of understanding something more complicated than the "traditional method" which had been in use for fifty years, were major reasons for slow acceptance of the interest-adjusted method.

This situation was reflected in a paragraph of the statement of the ALIA: "All measures of cost and value which are based on a single index have inherent limitations. If such an index is used, it should be accompanied by a statement of its qualifications and limitations. Indices

should not be emphasized to the point that actual premiums and policy benefits are overshadowed." This point is recognized in a "limitations" section of the NAIC model regulation on the interest-adjusted index, and we will minimize troubles and maximize help to the buyer by recognizing this point in all we say and do.

Wisconsin Regulation 2.15 requires that the interest-adjusted cost index be furnished to the buyer at his request or in any case prior to or upon delivery of the policy. Companies, of course, have complied with the regulation and furnished the figures, with instructions, explanations, and forms on which the information can be supplied. The problem is that it still has been difficult for agents to explain the figures to customers. Until agents understand it, believe it to be a credible means of comparison, and develop a means of explaining it in terms their customers can understand, we will not have a good experience with the method. I believe that this will come, but that we need evolution, not revolution.

It is heartening that, in the current draft of the NAIC proposed model regulation on this subject, the interest-adjusted index is intended to be used not on a mandatory basis in every situation but only where the buyer asks for it. Here we have a different situation. If the buyer asks for the index, then he will be in a frame of mind to understand it and to use it. This, I think, will create a much better climate for its use and gradually lead to better and wider acceptance.

As for the Pennsylvania *Shoppers' Guide*, we have had very little reaction to it. In summary, from a company listed in the top ten, you tend to get favorable comments. In the case of adverse listings, I believe that the guide has had some degree of adverse effect on such companies' sales. Certainly people want to buy a product at low cost or with a good value. They are quite willing to apply this attitude to life insurance if they have something to go on. Efforts such as the Pennsylvania *Shoppers' Guide* do raise the level of the public consciousness of this subject. I can only repeat, however, that no single index can do the job, and the problem with shoppers' guides lies in whatever tendency there may be among buyers to rely solely on such indexes.

MR. GUSTAFSON: I think there is a certain inconsistency in our answers to some questions. In answer to the question, "What has been the impact of the Pennsylvania *Shoppers' Guide* [on consumers]?" as I recall, a large number said either "Don't know" or "None"; but in the next question, "Did the public benefit from the *Shoppers' Guide*?" few of us answered "None." I think that is an excellent lesson in how to draft a questionnaire.

MR. OVERBERG: Let us distinguish between cost comparisons and shoppers' guides. Shoppers' guides could alert the public to the fact that all life insurance policies are not created equal and, therefore, the consumer is advised to shop and obtain "cost comparisons" for his specific age, desired plan, and amount of insurance. However, this is not how shoppers' guides have been used. They compare one specific policy at one (or a few) specific age and for one amount of insurance. They usually are misinterpreted as a ranking of companies rather than a ranking of a specific policy. The lay press is quick to pick up that Companies A, B, and C are low-cost companies and Companies X, Y, and Z are high-cost companies. The press does not read or print the limitations of shoppers' guides.

The basic purpose of the shoppers' guides should be to encourage the consumer to shop—to obtain adequate cost information from at least two companies—and then to let each agent defend his policy against that of the other company.

MR. HUEY: The next three items in the questionnaire (Question V) concern the perceived impact of the Pennsylvania *Shoppers' Guide*. A significant number checked off "Don't know" or made no response—that in itself may say something. There was some variation by type of affiliation, with mutual companies seeing a somewhat greater impact. Overall, the indications are that the guide did not change anyone's operation for very long, although it slowed things down for a while, caused some concern, and upset the agents to a small extent. From the company point of view, we see that not only were people in the home office talking about it—there was also considerable overt activity and even some rate action.

Question VI asked: "How much did the public benefit from the *Shoppers' Guide* [either directly, or indirectly]?" There was some direct benefit perceived; most of the benefit is seen as indirect.

Responses to Question VII indicate that more than half do not feel that the guide ranks companies on the basis of true "life insurance cost."

MR. OVERBERG: I will answer the question, "What would be the long-range implications of increased price disclosure and cost competition?" by asking a question: "Should the assumptions used for dividend illustrations by a stock company—which issues both participating and nonparticipating—have any relationship to the assumptions they use in calculating their GAAP earnings?" I realize that currently this would be illegal in some states because dividend illustrations are supposed to be based on current scale.

I raised the issue however, only to remind consumer advocates that dividend illustrations are not projections nor estimates. Is it consistent to tell your policyholders one thing and your stockholders another thing?

Regarding the question of actuaries' playing a larger role in cost comparisons, I do not subscribe to the implication that the actuaries have not been involved in the discussions of cost comparisons. There are many actuaries who have devoted a considerable amount of time to this subject. I also believe that great strides have been made—in shedding light and heat on the subject.

We must approach this subject as though we were the consumers. We must recognize that, even among actuaries, there is honest disagreement as to which of several personal life policies is the best buy. After all, you and I are consumers. Let us act and think like them.

MR. HUEY: Question VIII of the questionnaire reads: "This week the NAIC Task Force on Life Insurance Cost Comparisons will propose model regulations regarding disclosure practices." Most of the group indicated the response, "I am not acquainted with these proposals." Those who were acquainted with them felt that the major impacts would be on future pricing and dividend scales, with some significant impacts on the scope of life insurance product design and marketing. Few of us see them affecting our own jobs outside these three areas, but only very few see them as having no impact at all.

CHAIRMAN RUGLAND: I would like to ask Bart Munson to make a few comments regarding the work of the Ad Hoc Committee before we conclude this session. If there are any questions about the committee, they can be asked of him at this time.

MR. MUNSON: It is important not to have the wrong impression of where the committee and the Society stand at this moment and to have some feeling for our profession's degree of involvement. Let me attempt to clarify it. Our committee will report to the Executive Committee, hopefully next week, in response to our charge. Our charge was: In our opinion, should the Society of Actuaries attempt to express an opinion on any matter dealing with "truth in life insurance"? If so, what? If not, why not? Our recommendation to the Executive Committee will be that we do not express an opinion, at least at this time. We do plan to report within the next week on developments at the NAIC level and the NAIC's invitation to do some research. We also plan to report on the research

intentions of the Hart subcommittee and what is going on at the moment in Washington. We do plan to recommend to the Executive Committee that the Society of Actuaries accept the invitation of the NAIC to do the research that they have listed in the task force report. It is up to the Executive Committee to decide whether or not the Society should respond favorably to that invitation. It is also up to them to decide who will do that research in the Society, if indeed the Society does it, and to indicate whatever general guidelines they would like to have followed in that activity. Our committee, I think it is safe to assume, will make some recommendations as to how we think they might respond, but the decision is up to them.

This is just a personal comment—I am not speaking for the committee now—but to me it is refreshing to hear some of the questions and comments that were presented today. It sounds to me as if we might be a more consumer-oriented group than we would have been five years ago if the same discussion had come up, and I think that is healthy.

One final comment on behalf of our committee. We appreciated the discussions at St. Paul a couple of weeks ago; we appreciate the letters some of you have written. We have noted and appreciate the caution that some of you have given us that suggests that we act properly and act professionally. Unarguably, that should be the objective of a professional body of actuaries. We have also noted and appreciate the many urgings that this is a matter in which actuaries probably should become involved and that we should see whether we can contribute to some enlightenment, with the end result inuring to the benefit of the industry, the regulator, the profession, and ultimately, of course, the consumer. We would welcome your further thoughts, comments, and questions.

SUMMARY OF ANSWERS RECEIVED IN RESPONSE TO QUESTIONNAIRE DISTRIBUTED AMONG SOCIETY MEMBERS ATTENDING CONCURRENT SESSION ON PRICE DISCLOSURE AND COST COMPARISON

Please help us tell you what you think by checking appropriate boxes.

First, who are *you*?

47%	F.S.A.	26%	Consultant	52%	Under age 35
53%	A.S.A.	45%	Mutual company	32%	35-50
—	Other	29%	Stock company	16%	50-65
		—	Other	—	65 or over

I. What constitutes a minimum level of adequate price disclosure for life insurance?

- 32% 1. Premium, nonforfeiture values, and dividends year by year for twenty years, using illustrated dividends but identifying them as not guaranteed, etc.
- 47% 2. Item 1 plus interest-adjusted cost (and interest-adjusted payment) index values for ten and twenty years at 4 per cent.
- 6% 3. Item 2 plus first five years of commissions paid to the salesman.
- 2% 4. Item 1 plus anticipated benefit/premium ratios for the policy (benefits include death and surrender benefits; premiums are reduced by illustrated dividends).
- 10% 5. A breakdown of the level premium into components assigned to identified benefits and other cost factors.
- II. The *practical* life insurance cost index should meet which of the following criteria?
- A. Valid and not misleading; rational and understandable to purchaser; and employs a minimum of arbitrary assumptions.
- B. Allows for time value of money.
- C. Allows for expected mortality probabilities.
- D. Allows for surrender expectation probabilities.
- E. Allows for *nonguarantee* of dividends in an obvious manner by requiring several index values dependent on differing assumptions of dividend realization.
- 15% 1. All of the above
- 8% 2. All except E
- 3% 3. A and E only
- 21% 4. A, B, and E
- 53% 5. Other (*circle applicable letters*): A(53%) B(36%) C(2%) D(—) E(—)
- III. The best “nontechnical” description of an ordinary whole life plan of insurance is
- 44% 1. Fixed amount guaranteed death benefit payable whenever death occurs, funded by guaranteed level premiums to point of benefit payment.
- 32% 2. Fixed amount guaranteed death benefit payable whenever death occurs, funded by guaranteed level premiums with buyout discontinuance provision where the policyowner can unilaterally surrender death protection for cash in lieu of further protection and premium payments.
- 3% 3. Guaranteed savings funded by level deposits which pay a death benefit in case of premature death.
- 10% 4. Decreasing term insurance to age 100 and increasing savings account funded by level deposits.
- 7% 5. Other.

- IV. Can one type of "cost index" adequately serve all purposes surrounding life insurance marketing?
- 8% 1. Yes
  - 82% 2. No
- V. What has been the impact of the Pennsylvania *Shoppers' Guide*
- A. On "consumers"?
- 15% 1. None
  - 29% 2. Caused concern, suspicions, questions, etc.
  - 7% 3. Introduced competition
  - 3% 4. Determined purchase decision
  - 39% 5. Don't know
- B. On agents/brokers?
- 18% 1. None
  - 39% 2. Caused concern
  - 5% 3. Impeded production temporarily
  - 4. Changed method of operation
  - 31% 5. Don't know
- C. On companies?
- 3% 1. None
  - 27% 2. Minor annoyance
  - 19% 3. Public relations only
  - 18% 4. Rate adjustment or other policy change
  - 24% 5. Don't know
- VI. In your opinion, how much did the public benefit from the Pennsylvania *Shoppers' Guide*?
- A. Directly—in the form of the consumer's getting more benefit for his money.
- 45% 1. None
  - 40% 2. Some
  - 2% 3. Lots
- B. Indirectly—in that the guide acted as a catalyst to get more consumerism in life insurance.
- 14% 1. None
  - 53% 2. Some
  - 20% 3. Lots
- VII. In your opinion, does the Pennsylvania *Shoppers' Guide* rank companies on the basis of true "life insurance cost?"
- 13% 1. Yes
  - 55% 2. No
  - 23% 3. I am not acquainted enough with the guide to be qualified to answer the question.
- VIII. This week the NAIC Task Force on Life Insurance Cost Comparisons will propose model regulations regarding disclosure practices in life insurance selling as well as the interest-adjusted cost index.

- 53% 1. I am not acquainted with these proposals.
- 42% 2. I am acquainted with these proposals, and I feel (*check the applicable comments*)
- 15% a) They will have impact on future product design.
- 32% b) They will have impact on future pricing and dividend scales.
- 8% c) They will make my job as an actuary in a life company take on a different slant.
- 11% d) They will change the scope of life insurance marketing.
- 3% e) They will have none of the above impacts.

## TIME SERIES ANALYSIS AND FORECASTING

### *San Francisco Regional Meeting*

1. Review of techniques for analyzing times series.
2. Presentation of case studies of forecasting in actuarial science.
3. General discussion of forecasting methods. Participants will be urged to describe their experiences with various forecasting methods.

CHAIRMAN PAUL MARKHAM KAHN: In 1964, the Board of Governors of the Society of Actuaries established the Committee on Research and charged it with "maintaining links with current thinking on . . . new methods of statistical analysis." Last year this committee sponsored an actuarial research conference at the University of Waterloo which was directed to a review of some of the many significant recent improvements in the techniques used for the analysis of time series data and their application to actuarial problems. Enough interest was generated to sponsor discussions at the two later regional meetings, in St. Paul and San Francisco.

The essential task of an actuary, like that of astrologers of olden times (commonly called financial analysts today), is to foretell the future. In particular, he must predict the course of the basic processes affecting an insurance business and project their financial consequences. Propelled by such developments as adjusted earnings and variable life insurance, the actuaries are now forced to improve their projection methodology.

We are all familiar with some of the qualitative forecasts available to actuaries, such as those discussed in a concurrent session at the 1971 annual meeting in Toronto on forecasting the environment for business or the Delphi techniques practiced in the isles of Greece.

This session will dwell on a quantitative technique, that of the analysis of data representing a process at different points in time. This type of analysis characteristically provides some warning when patterns in past observations result from a change in the underlying process and are not simply random fluctuations, as we have seen in recent annuitant mortality studies.

This session will deal mainly with parametric modeling of stochastic time series. There are certainly other technical methods of capturing insights from past observations, such as econometric models, smoothing operations, and spectral analysis, but the methods that will be discussed

this morning have proved useful in many diverse fields, they are relatively easy to apply, and they provide some built-in safeguards against seeing illusory patterns in the past.

MR. DONALD A. JONES: As an example of an actuarial application of the time series procedures which have been ably described for this session by Professor Miller, we will use some hospital insurance data provided by an actuary who wishes to remain anonymous.

#### DATA SECTION

The ultimate objective in this example would be to set hospital insurance rates. We shall restrict our attention to estimating the expected annual claims per insured without reference to the expense and interest components of rates. The expected claims will be estimated by analyzing the time series of monthly claims per insured,  $Y_t$ . The numbers in this series are derived from other monthly accounting series, including the number of lives insured,  $E_t$ , but we shall assume that the relevant information is summarized by  $Y_t$ . Since the exposure changes are slight, this assumption is not too extreme.

After we have decided to use the time series of monthly data  $Y_t$  for our estimation of expected claims, we must decide the historical period relevant to our objective; that is, for how many months have the  $Y_t$ 's been generated by the current stochastic mechanism? At the time of our analysis, data were available through August, 1971. The start-up of Medicare on July 1, 1966, produced a different stochastic mechanism for months following that date. Thus, this example's analysis is based on the 62 observations of the time series from July, 1966, through August, 1971. You may observe that the plots contain 72 observations; the last 10 through June, 1972, were obtained after the analysis.

The next step of the analysis was the choice of a transformation or filter to apply to the series prior to model identification. One purpose of applying a transformation would be to compensate for a periodicity. Our series,  $Y_t$ , showed a 12-month cycle, probably due to the varying lengths of months and to the impact that elective surgery has on hospitalizations. We could have filtered the series, that is, applied a 12-term moving average or analyzed the series for each of the 12 calendar months. However, filtering would have produced a series of 51 points, and analysis by month would have been based on only 5 points, so we chose to ignore the periodicity.

Next we looked at plots of  $Y$ ,  $\nabla Y$ ,  $\nabla^2 Y$ ,  $\log Y$ ,  $\nabla \log Y$ , and  $\nabla^2 \log Y$  (Figs. 1-6). In each plot the independent variable (month) is on the long

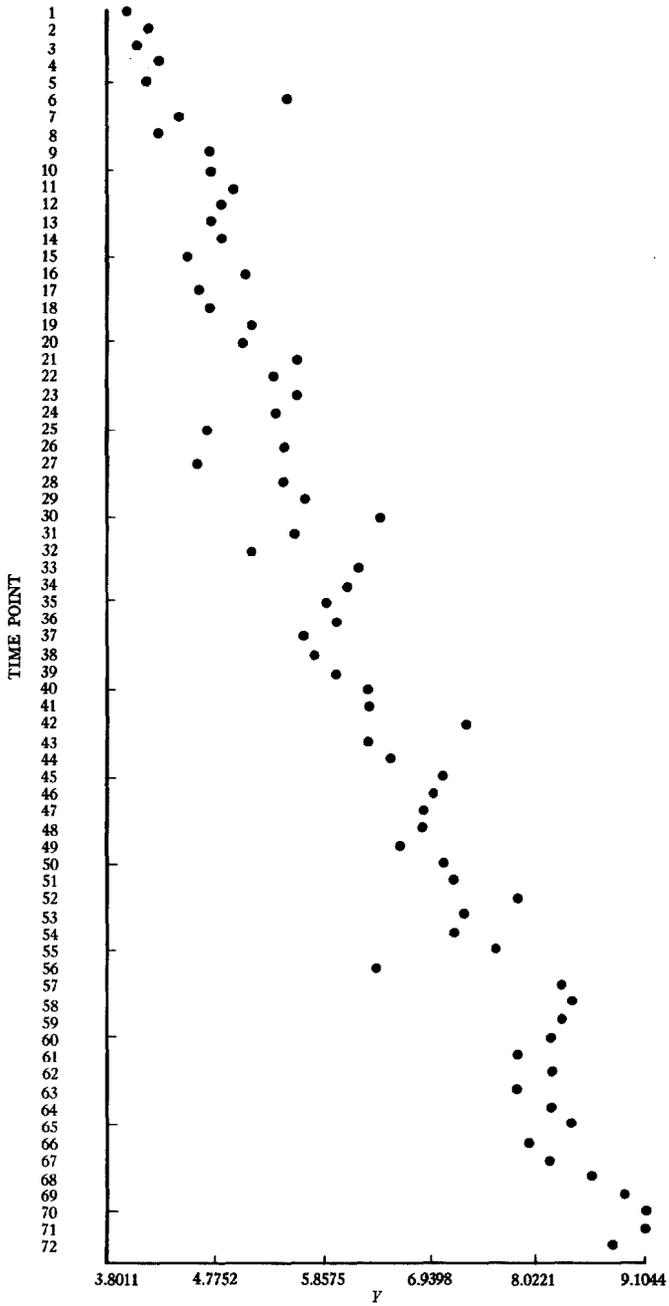


FIG. 1.—Plot of  $Y$  versus month (72 observations)

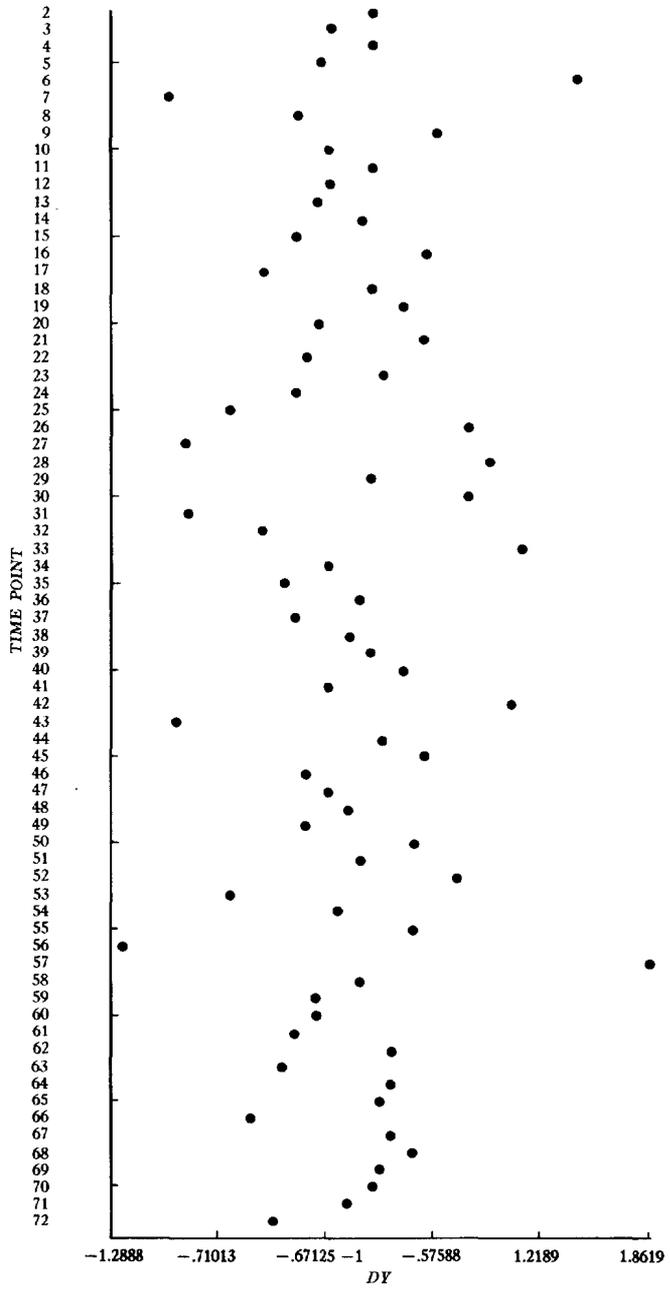


FIG. 2.—Plot of  $\nabla Y$  versus month (71 observations)

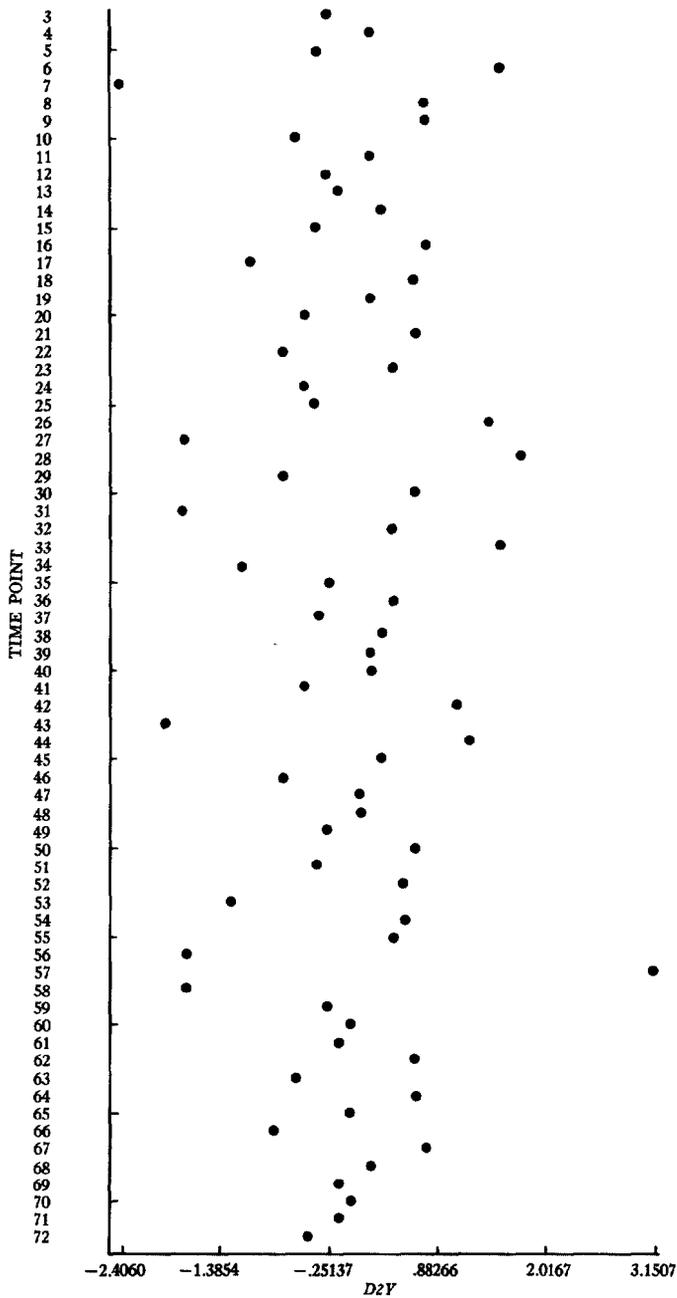


FIG. 3.—Plot of  $\nabla^2 Y$  versus month (70 observations)

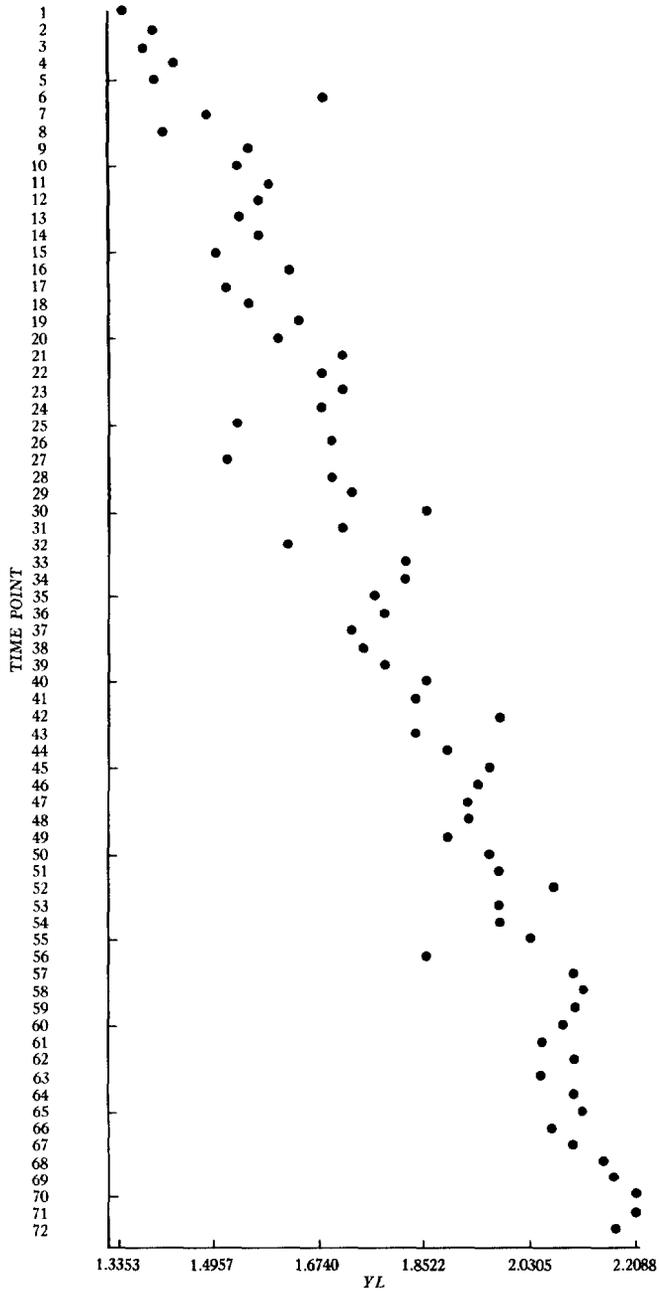


FIG. 4.—Plot of  $\log Y$  versus month (72 observations)

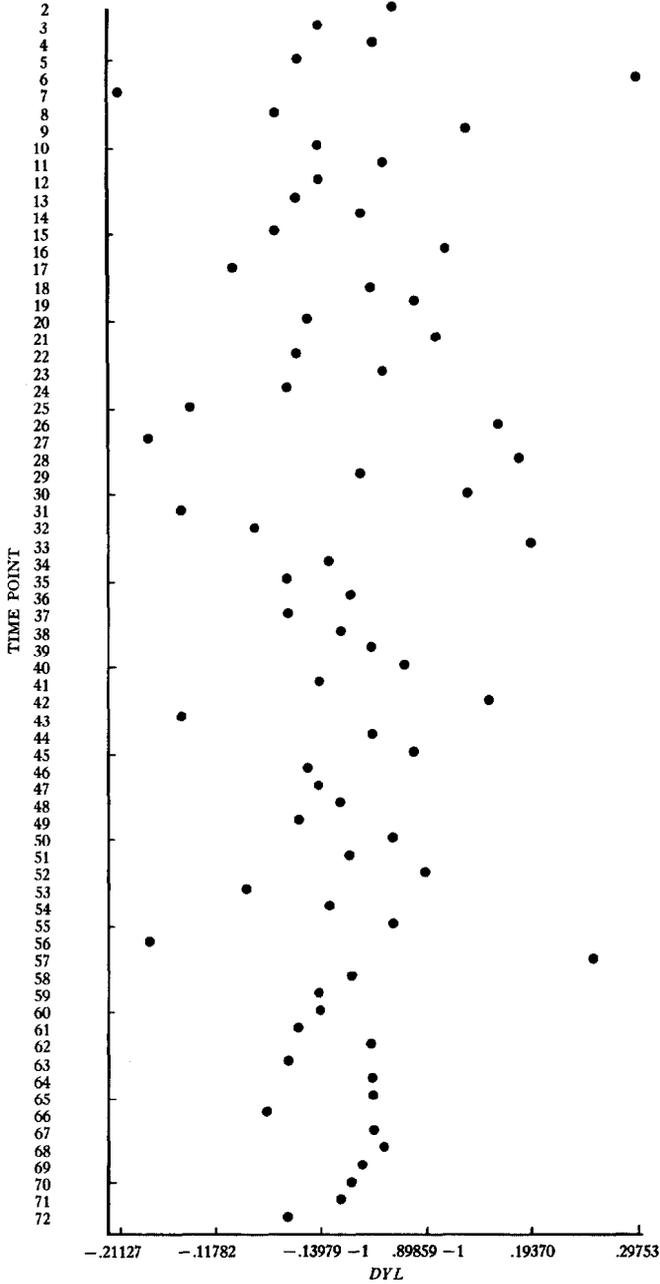


FIG. 5.—Plot of  $\nabla \log Y$  versus month (71 observations)

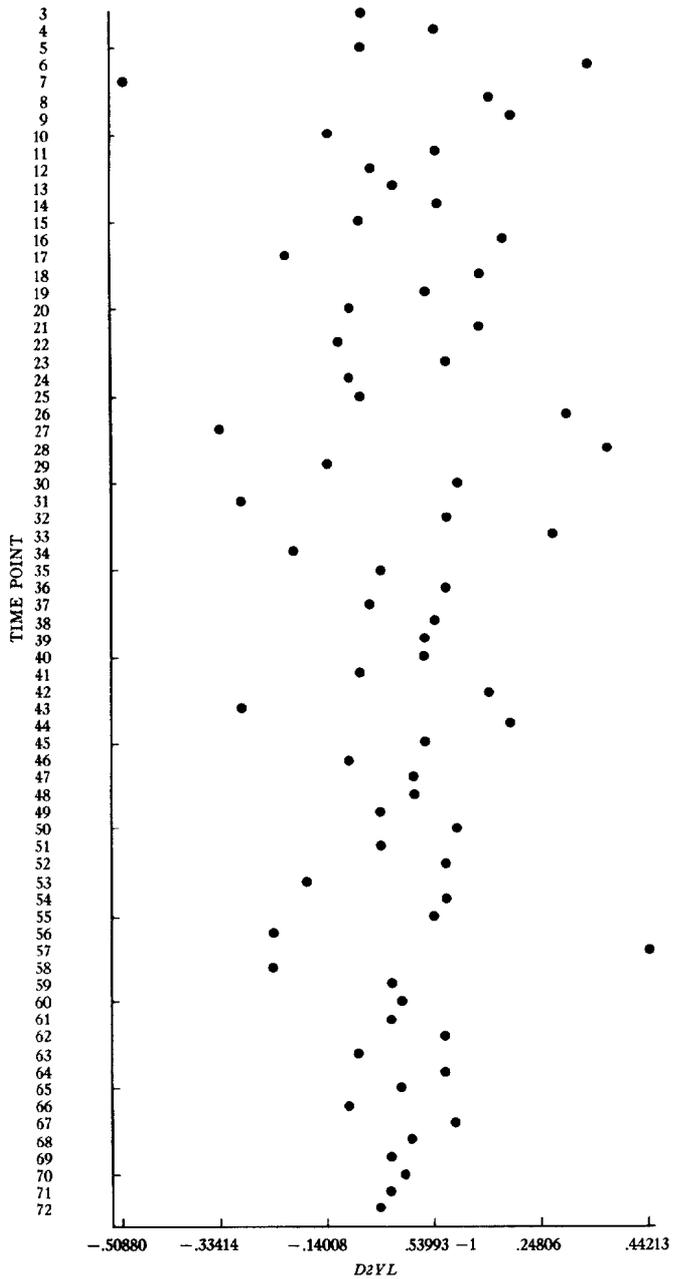


FIG. 6.—Plot of  $\nabla^2 \log Y$  versus month (70 observations)

vertical axis. On the horizontal axis you will find the dependent variable, with its computer label  $Y$ ,  $DY$ ,  $D2Y$ ,  $YL$ ,  $DYL$ , or  $D2YL$ . On these plots  $x - k$  is shorthand for  $x \times 10^{-k}$ ; for example,  $.89859 - 1$  is  $0.089859$ . Recall that our analysis was based on only the first 62 months.

The  $Y$  series is slightly exponential; this may be verified analytically by comparing the points with their least-squares line. Thirteen of the first 21 points are above this line, 6 of the next 21 points are above the line, and 12 of the last 20 are above the line. The corresponding counts for the  $\log Y$  series are 10, 10, and 12. The medians of the 61  $\nabla \log Y$  points and the 60  $\nabla^2 \log Y$  points are essentially zero.

In summary, we chose to ignore the slight 12-months periodicity and selected  $\log Y_t$  for analysis because of its near-linear trend.

MODEL IDENTIFICATION

The next step in the analysis was model identification by examination of the sample autocorrelation functions (SACF's) for  $\log Y$ ,  $\nabla \log Y$ , and  $\nabla^2 \log Y$ , which are given in Figures 7-9. Each function is printed as a combination of a table and a graph. For example, the SACF for  $\log Y$  is given in Figure 7. In the legend are given the variable name,  $YL$  (which is the label for  $\log Y$ ); the maximum lag for which a correlation is calculated, 30, since it is not reasonable to estimate autocorrelations at lags

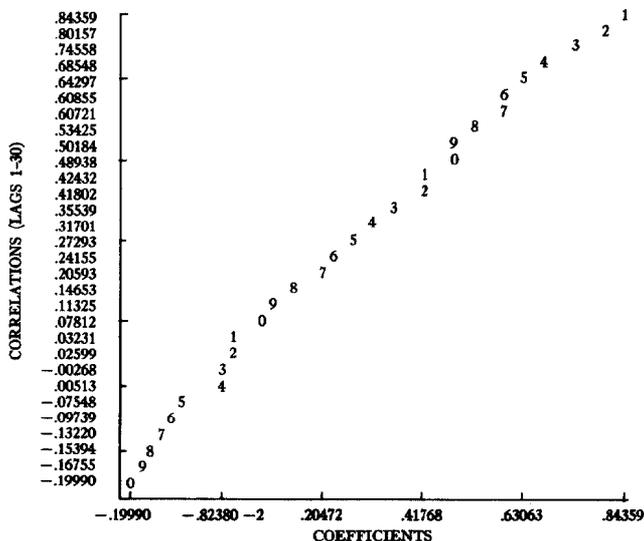


FIG. 7.—SACF for  $\log Y$  ( $YL$ ). Maximum lag, 30; time points 1-62; number of points, 62.

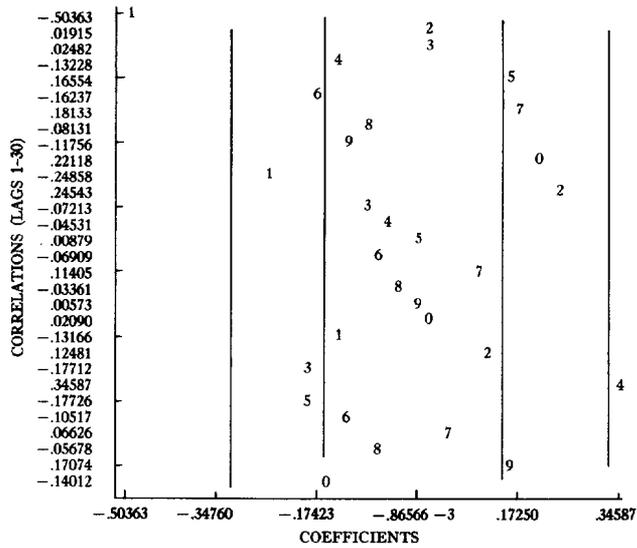


FIG. 8.—SACF for  $\nabla \log Y$  (*DYL*). Maximum lag, 30; time points 2–62; number of points, 61. (See text for explanation of vertical lines.)

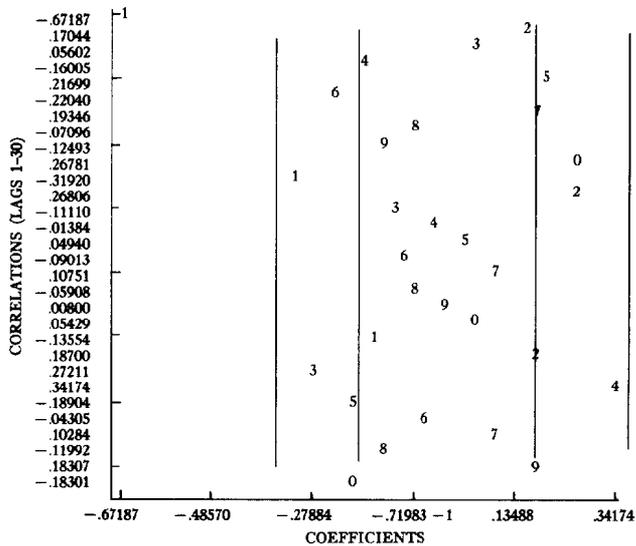


FIG. 9.—SACF for  $\nabla^2 \log Y$  (*D2YL*). Maximum lag, 30; time points 3–62; number of points, 60. (See text for explanation of vertical lines.)

beyond 12–15 on the basis of only 62 points and thus our decisions were based on only the top half of each SACF; the points used to calculate the correlations, 1–62; and the number of points, 62. The numbers on the vertical axis are the correlations for lags 1–30, in that order reading down. These correlations are represented graphically by the 30 digits plotted above the horizontal axis, which shows the scale for the correlations. The digit plotted is the last digit of the lag used to calculate the correlation shown on that line at the vertical axis—for example, 0.24155 is the correlation for lag 16.

The SACF for  $\log Y$  ( $YL$ ) in Figure 7 has the straight-line appearance of a SACF for a nonstationary series. The SACF for  $\nabla \log Y$  ( $DYL$ ) in Figure 8 appears to be that of a moving average model of order 1, or MA(1), model. The vertical lines on that graph are the approximate one and two standard errors under the assumption of zero autocorrelations. Thus it appears that  $\rho_1 = -0.50$  and  $\rho_t = 0$  for  $t \geq 2$ . There is some bad news here, since  $|\rho_1| < 0.5$  for invertible MA(1) models. The SACF for  $\nabla^2 \log Y$  ( $D2YL$ ) in Figure 9 looks like the one for  $\nabla \log Y$ , so an integrated autoregressive moving average model, ARIMA(0, 1, 1) or ARIMA(0, 2, 1), model is indicated for the  $\log Y$  series.

#### PARAMETER ESTIMATION

The SACF's for  $\nabla \log Y$  and  $\nabla^2 \log Y$  suggest either

$$\nabla \log Y_t = \theta_0 + a_t - \theta a_{t-1}$$

or

$$\nabla^2 \log Y_t = \theta'_0 + a_t - \theta' a_{t-1}.$$

Since the  $\log Y$  series follows a line with positive slope,  $\theta_0$  should be positive and  $\theta'_0$  should be zero. Statistical tests for these two hypotheses, which may be found in section 4.3.1 of Box and Jenkins,<sup>1</sup> verified our visual interpretation of the series.

The least-squares estimate for  $\theta$  in the ARIMA(0, 2, 1) model was 0.98. The least-squares estimates in the ARIMA(0, 1, 1) model were  $\theta_0 = 0.01133$  and  $\theta = 0.983$  (these should be rounded to two significant figures).

#### DIAGNOSTIC CHECKING

If the fitted ARIMA(0, 2, 1) model is adequate, then the series

$$\hat{a}_t = \nabla^2 \log Y_t + 0.98\hat{a}_{t-1}$$

should appear to be independent, identically distributed random variables. The SACF for this series is given in the upper figure in Figure 10.

<sup>1</sup> G. E. P. Box and G. M. Jenkins, *Time Series Analysis: Forecasting and Control* (San Francisco, Calif.: Holden-Day, 1970).

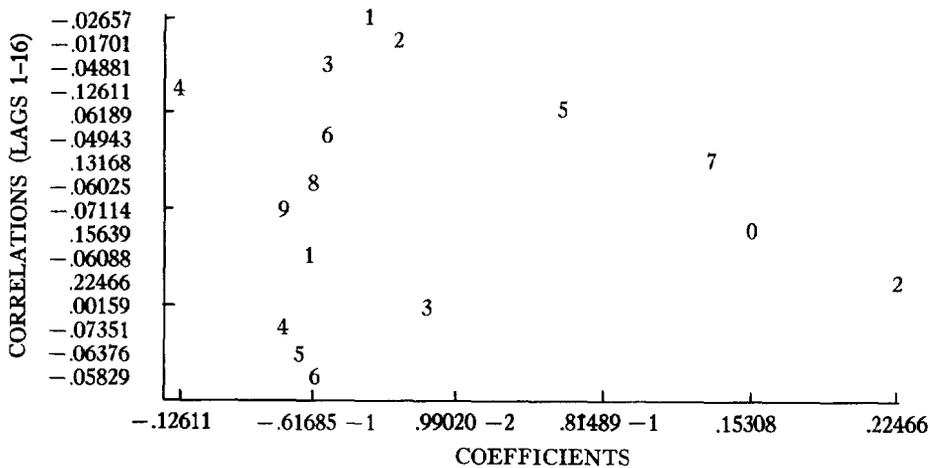
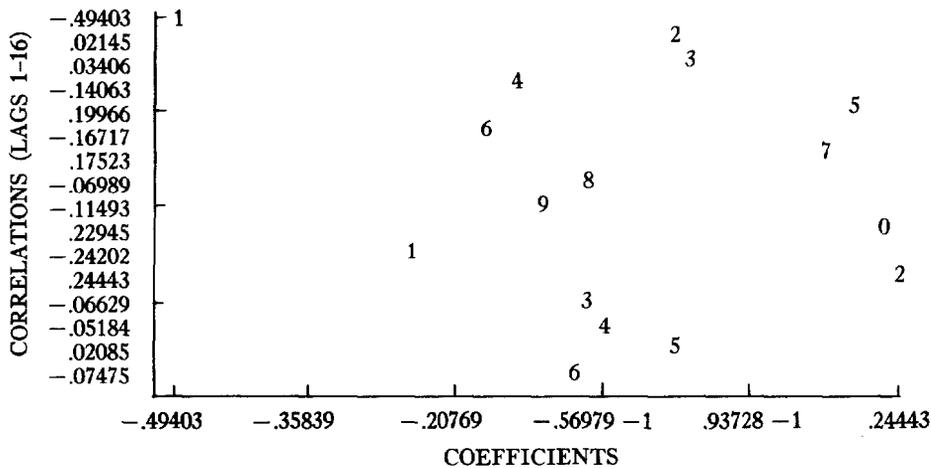


FIG. 10.—SACF's for log  $Y$ . *Top*: ARIMA(0, 2, 1) model,  $\theta_1 = 0.98$ ; maximum lag, 16; time points 1-62; number of points, 61 ( $\chi^2_{16} = 35.1$ ). *Bottom*: ARIMA(0, 1, 1) model,  $\theta_0 = 0.01133$ ,  $\theta_1 = 0.983$ ; maximum lag, 16; time points 1-62; number of points, 62 ( $\chi^2_{16} = 8.87$ ).

The lag 1 correlation is  $-0.49403$ , whose magnitude is significantly different from zero. An approximate summary check of the first  $K$  autocorrelations of the residuals of an ARIMA( $p, d, q$ ) model is given in Box and Jenkins (p. 291) by comparing the product of the sum of the squares of the  $K$  sample autocorrelations and  $(N - d)$  with the chi-square distribution with  $(K - p - q)$  degrees of freedom. For the ARIMA(0, 2, 1) model and  $K = 16$ , this product was 35, which is greater than the 99.5 percentile of the chi-square distribution with 15 degrees of freedom. Hence the ARIMA(0, 2, 1) model "failed" the diagnostic checks.

Similarly, if the ARIMA(0, 1, 1) model is adequate, then the series

$$a_t = \nabla \log Y_t - 0.01133 + 0.983a_{t-1}$$

should appear to be independent, identically distributed random variables. The SACF for these residuals is in the lower part of Figure 10. For this model the product of  $(62 - 1)$  and the sum of the squares of the first 16 autocorrelations is less than 9, which is less than the median of the chi-square distribution with  $(16 - 2)$  degrees of freedom. This ARIMA(0, 1, 1) model has good diagnostic checks.

FORECAST ERRORS FOR THE ARIMA(0, 1, 1) MODEL

An important part of forecasting by time series models is the measure of forecast error that is also provided. From Box and Jenkins (p. 145) the variance of the forecast at lead  $l$  for an ARIMA(0, 1, 1) model with *known* parameters is

$$\sigma^2\{1 + (l - 1)(1 - \theta)^2\}$$

where  $\sigma^2$  is the common variance of the  $a$ 's. This forecast variance may be estimated by substituting the least-squares estimates for  $\theta$  and  $\sigma^2$ , namely, 0.983 and 0.00466. Because of the large estimate of  $\theta$ , the forecast standard deviations are in the interval (0.0682, 0.0686) for all leads up to 36. Hence, for each of these leads,

$$\log Y_{62+(l)} \pm 2(0.0686)$$

is an approximate 95 per cent prediction interval for  $\log Y_{62+l}$ . The antilogs of the end points of these intervals,

$$(0.872)e^{\log Y_{62+(l)}}, \quad (1.147)e^{\log Y_{62+(l)}},$$

provide 95 per cent prediction intervals for  $Y_{62+l}$ .

In Figure 11 are plotted the  $\log Y$  series and the series generated by the ARIMA(0, 1, 1) model. The  $I$ 's denote the model values, the  $Z$ 's the observed values, and the  $x$ 's the values where 1 and 2 coincide. The first 62 points of the series were used to construct the model, and the

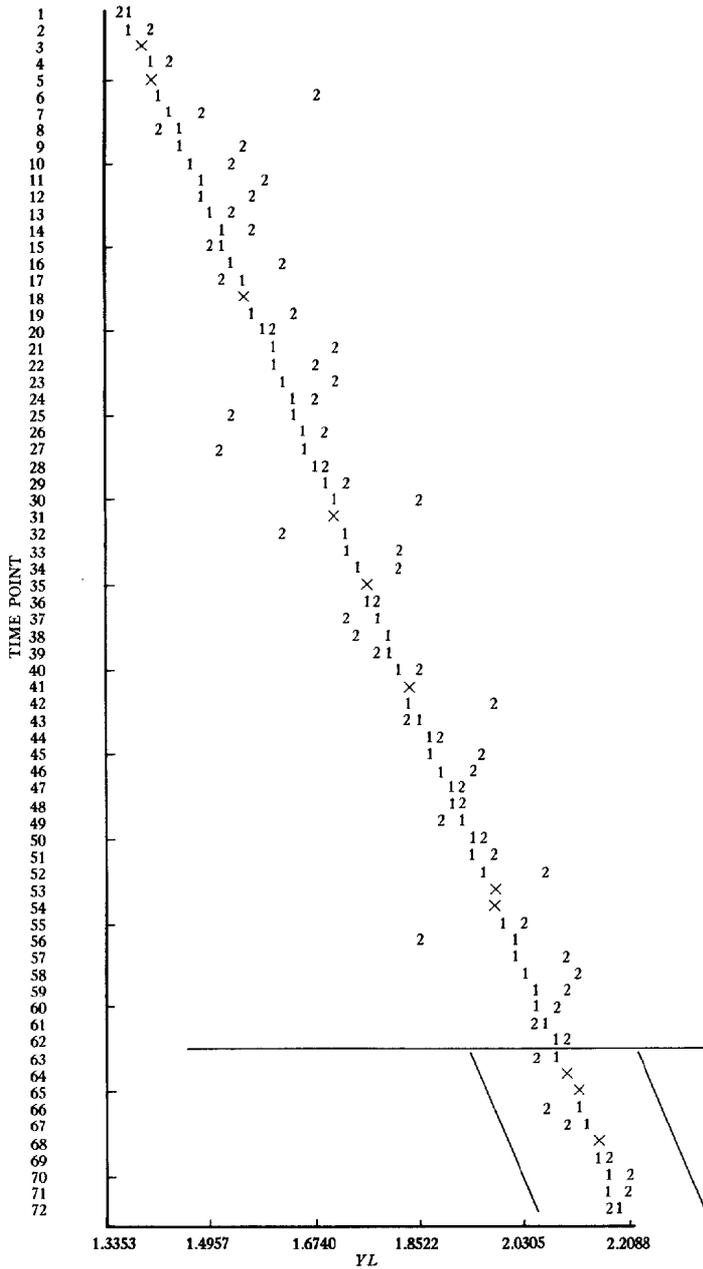


FIG. 11.—SACF for log  $Y$ : 1's denote ARIMA(0, 1, 1) model value ( $\theta_0 = 0.01133$ ,  $\theta_1 = 0.983$ ); 2's denote observed values; X's denote values where 1 and 2 coincide. Number of observations = 72. (See text for explanation of lines.)

values from 63 through 72 are plotted for comparison. The two lines parallel to the series are the 95 per cent forecast error lines. Note that these are "one-at-a-time" error lines and not "simultaneous intervals"; that is, the 95 per cent applies to each term separately and not to several of them jointly.

#### SUMMARY

We have developed a forecasting model for individual monthly hospital claims. The model includes probabilistic error bounds.

The data for the example follow a linear trend which suggests that simple linear regression might develop a suitable model. The current practice of the actuary who provided the data is to apply linear regression to a 12-term moving average of the log  $Y$  series. Our time series model is also very similar to a linear regression model.

MR. PAUL D. SHERIGER:\* The two main references on the Box-Jenkins approach to seasonal time series analysis are chapter 9 of G. E. P. Box and G. M. Jenkins, *Time Series Analysis Forecasting and Control* (San Francisco, Calif.: Holden-Day, 1970), and D. W. Bacon, *Seasonal Time Series* (Ph.D. thesis, University of Wisconsin, 1965). For applications the latter reference is indispensable, since the chapter in Box and Jenkins only analyzes one series and is primarily introductory. Bacon presents a detailed analysis of eleven different time series covering the spectrum of models one would typically find in business and economic applications. Since fitting seasonal models to economic series is an art requiring a trial-and-error approach, examples are absolutely necessary.

A good example of the trouble one can get into is an application paper presented by a professor of mathematics at the 1972 Actuarial Research Conference in Waterloo, Ontario. He burned up much computer time trying to fit a series with a model having about six or seven parameters. He had read only Box and Jenkins, and he mixed the seasonal and nonseasonal approaches. The series could have been fitted quickly using only three parameters, as is done with most economic seasonal series. Reading Bacon would have prevented his unsuccessful fit.

Besides giving examples, Bacon presents a history of time series analysis, shows why his approach is more elegant and simpler to apply than the traditional methods, and presents sufficient theory to enable intelligent application of his method. There is a complete FORTRAN listing of all necessary programs for both identification and fitting of the

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models he presents in his thesis. A newer program can be obtained from the Statistical Department of the University of Wisconsin for \$10.

Since it is difficult to understand programs written by others, and since fitting seasonal series means estimating from one to four parameters (most series require two or three), we have found it easier to write our own program. This has the additional advantage of not requiring any initial estimates of the parameters—estimates that are usually very unreliable (because they are based on the sample autocorrelations, which are frequently rather deceptive for short series) and are hard to get because they require simultaneous solution of nonlinear equations.

The procedure requires understanding the forward and backward recursion method used by Box and Jenkins (p. 317) and/or Bacon (p. 84) to calculate the sum of the squared residuals for any model. First calculate this sum for the model with all parameters set equal to zero. Then calculate the sums by successively increasing and decreasing each parameter by 0.2, which seems to be the best value for most series. Say that we have two parameters in our model,  $A$  and  $B$ . Calculate the sums with  $A$  equal to 0.2 and then equal to  $-0.2$ , with  $B$  equal to zero. Then do the same with  $B$ , and have the program choose which of the four values gives the smallest sums function. In 2-dimensional space this is then your new "origin." Using the new origin, start successively incrementing the parameters by 0.2 again and then move to the next origin, which represents a further decrease in the value of the sums function.

What the program effectively does is progress through 2-space, picking points which give successively a smaller sum-of-squared-residuals function—that is, it "climbs down" the likelihood surface to the minimum. The extension to higher-dimensional spaces is obvious. Once one reaches a relative minimum, one can decrease the unit of incrementation to 0.1, which is about as small as one would care to go, since these models are generally quite "robust" in regard to parameter values. (The likelihood surface does not change too fast relative to values of 0.2 or 0.1.) The extension to 3- and 4-space is obvious. Generally it is better to steer the program yourself, in the sense that the computer prints out the variance at each new origin point and pauses until you hit the return key. This is advisable in case of unusual likelihood surfaces.

If you can obtain only the Box-Jenkins text, it is possible to apply the method, but restrict yourself to the models on page 329 (which are the same as those used by Bacon) instead of cooking up your own—at least until you become familiar with the philosophy of the approach.

Both texts have algorithms which can be programmed for performing

the various differencing schemes needed for identification, and the theory is quite straightforward. Forecasting is extremely simple, for, as both texts show, it merely entails a recursive scheme that is very easy to program.

Another student at Wisconsin, W. P. Cleveland, Jr., has carried the above approach even further in his Ph.D. thesis, *Analysis and Forecasting of Seasonal Time Series* (1972). The Box-Jenkins approach assumes that each quarter has the same relationship to the like quarter in the previous year as the other three quarters do. This need not be true, however; seasonality may arise due to only one of the four quarters' having a definite seasonal pattern. Thus, in a nutshell, one must treat a series of quarterly observations as four separate series in the most general case. One will then use the Box-Jenkins nonseasonal models to fit each of these series. Cleveland shows how to determine whether this extension of the Box-Jenkins method is required and presents examples, one of which is the same series fitted by Box and Jenkins in chapter 9. The residual variance of the Cleveland fit is somewhat better, and the model seems more realistic in an economic sense. The fact that the variance is not very much smaller shows that, in this case at least, the simpler models of the original approach are not too unrealistic.

Cleveland also shows why the X-11 Census Bureau program often does not entirely remove seasonality. The reason is that X-11 assumes only one of the Box-Jenkins models, so that, if a series is not of this type, the program does not work perfectly. The quarterly real gross national product series is a good example, as looking at the sample autocorrelation spectrum for its various differencing schemes shows.

This, of course, raises questions about regression analysis using deseasonalized data and econometric models built upon such data. Most econometricians seem to agree that seasonality should be taken care of in the regressions; thus it would seem that the welter of articles over the years on how to decompose time series is somewhat metaphysical now, since Box-Jenkins methods and correctly executed regression analysis using virgin data allow us to dispense with the problem. One does not ever have to use "deseasonalized" series.

**MR. CHARLES A. HACHEMEISTER:**\* I would like to address myself to the relationship of Box-Jenkins analysis to the simple polynomial regression of the series  $Z_t$  against time. Prior to being introduced to

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Box-Jenkins analysis, one might be inclined to represent a time series,  $Z_t$ , by the simple model

$$Z_t = c_0 + c_1t + c_2t^2 + \dots + c_d t^d + a_t, \quad (1)$$

where  $t$  is time, the  $c_i$ 's are coefficients to be estimated, and  $a_t$  is an error term. To develop the relationship of the models, we must first review some elements of Box-Jenkins analysis.

Box-Jenkins analysis begins with the review of estimates of the autocorrelation function,

$$r_k = \frac{\sum_{t=k+1}^n [(Z_t - \bar{Z})(Z_{t-k} - \bar{Z})]}{\sum_{t=1}^n (Z_t - \bar{Z})^2},$$

where

$$\bar{Z} = \sum_{t=1}^n Z_t / n.$$

If the  $r_k$ 's do not die out for large  $k$ , the series is considered nonstationary. To produce a stationary series, the series  $Z_t$  is differenced:

$$\nabla Z_t = Z_t - Z_{t-1}.$$

Estimates of the autocorrelation function of the differenced series are now reviewed to determine whether the differenced series is stationary. If not, another difference is taken until the resulting series is stationary. The stationary process is now of the form

$$w_t = \nabla^d Z_t.$$

The full Box-Jenkins model considers both autoregressive and moving average type models. The points to be made here do not concern the autoregressive aspects of the model; accordingly, we will only consider moving average models. The general moving average model is of the form

$$w_t = \theta_0 + a_t - \theta_1 a_{t-1} - \theta_2 a_{t-2} - \dots - \theta_q a_{t-q},$$

which, in terms of the backward operator  $B$ , is

$$w_t = \theta_0 + \left(1 - \sum_{i=1}^q \theta_i B^i\right) a_t. \quad (2)$$

It turns out that we wish the series to be "invertible" if we are going to use the data for forecasting. This implies that when equation (2) is restated in terms of past  $w_t$  values, the current value can be determined from the relatively short history available. In terms of the operator

$$\theta(B) = 1 - \sum_{i=1}^q \theta_i B^i,$$

equation (2) may be solved to give

where 
$$[\theta(B)]^{-1}(w_t - \theta_0) = a_t,$$

$$[\theta(B)]^{-1} = 1 - \sum_{j=1}^{\infty} \pi_j B^j$$

is the operator which is the inverse of  $\theta(B)$ :

$$[\theta(B)]^{-1}\theta(B) = 1.$$

Now if  $\sum_{j=1}^{\infty} \pi_j$  does not converge, this implies that, when we attempt to estimate  $w_t$  by

$$w_t = \theta_0 + \pi_1 (w_{t-1} - \theta_0) + \pi_2 (w_{t-2} - \theta_0) + \dots,$$

we obtain a meaningless answer.

It turns out that, to ensure invertibility, all the roots of the operator  $\theta(B)$  must be greater than 1 (or outside the unit circle, if they are complex).

With this background let us now return to the simple model (1). First of all, let us enrich the model so that it is a deterministically nonstationary moving average model,

$$Z_t = \sum_{i=0}^d c_i t^i + \theta(B)a_t, \tag{3}$$

where the roots of  $\theta(B)$  are all greater than 1.

If we took the  $d$ th difference of this process, we would obtain a new process,

$$w_t = \theta_0 + \theta^*(B) a_t, \tag{4}$$

where  $\theta_0 = d! c_d$  and  $\theta^*(B) = (1 - B)^d \theta(B)$ .

This process is clearly not invertible. Further, note that we have apparently thrown away all the lower-order coefficients of the deterministic trend by differencing and only using  $w_t$ , the  $d$ th difference of the series, for analysis.

What do we do now? Let us not worry about it for the moment but consider the fitting of the model (2). It turns out that for a given autocorrelation function there is a unique  $\theta(B)$  with roots all greater than or equal to 1. If all the roots are in fact appreciably greater than 1, the inverse operator converges quite rapidly. That is,  $Z_t$  can be wholly reconstructed, including any deterministic part, from a large enough set of data by using the Box-Jenkins procedures.

If, however, the roots of the operator are close to 1, as in model (4), then  $Z_t$  cannot be wholly reconstructed from any finite series.

To eliminate this problem, I would recommend that in analyzing time

series one follow the Box-Jenkins format to the point of the estimation of the parameters of the moving average operator  $\theta(B)$ . If the roots of this operator are all sufficiently greater than 1, there is no problem and the analysis may proceed as usual. If, on the other hand,  $\theta(B)$  has roots close to 1, drop back one difference and estimate another deterministic term. The resulting process will be stationary. This process should not be analyzed within the Box-Jenkins framework.

For example, if we attempt to model  $w_t^{(d)} = \nabla^d Z_t$  as a moving average process,

$$w_t^{(d)} = \theta_0 + \theta^{(d)}(B) a_t,$$

and  $\theta^{(d)}(B)$  has a root near 1, then the process  $w_t^{(d-1)} = \nabla^{d-1} Z_t$  should be modeled as

$$w_t^{(d-1)} = c_0 + c_1 t + \theta^{(d-1)}(B) a_t.$$

This should be continued until we reach the process

$$w_t^{(d-b)} = \sum_{i=0}^b c_i t^i + \theta^{(d-b)}(B) a_t,$$

where  $w_t^{(d-b)} = \nabla^{d-b} Z_t$  and  $\theta^{(d-b)}(B)$  is the moving average operator whose roots are not near 1.

We conclude with some notes of interest. First, if the above procedure is continued until  $b = d$ , we find that this is model (3) and further that model (1) is a special case of this. Second, as a question, what about the model with  $b > d$ ?

## INDIVIDUAL LIFE AND HEALTH UNDERWRITING

1. Physical factors: hypertension, cholesterol
2. Diabetics
3. Morals and habits, including drug use
4. Disability income limits in relation to income

### *St. Paul Regional Meeting*

MR. HARRY A. WOODMAN, JR.: Actuaries and underwriters are keenly conscious of the fact that hypertension is our most significant impairment from the standpoint of frequency, severity, and complexity. We are not nearly so conscious of the significance of elevated cholesterol, whose lack of prominence in underwriting today is comparable to that of elevated blood pressure perhaps forty or fifty years ago. Thus we are discussing today both an established impairment and one that seems to be emerging. Actually the term "impairment" is somewhat a misnomer, since both conditions are indicators of future impairments rather than impairments in themselves.

#### I. HYPERTENSION—WHAT WE KNOW

Hypertension is our most frequently occurring ratable impairment. A recent distribution of New York Life substandard issues (January–April, 1972) showed that elevated blood pressure was the sole impairment in 14 per cent of medically substandard issues and was combined with overweight as the only impairments in an additional 15 per cent of such issues. The incidence of elevated blood pressure as an impairment increases with age. Blood pressures over 140 systolic or over 90 diastolic occur at ages 15–39 in about 5 per cent of all cases; at ages 40–49 this increases to 10 per cent, and it increases to 20 per cent at ages 50–59 and to 30 per cent at ages 60 and over. For blood pressures over 150 systolic or over 95 diastolic, the comparable percentages are 2 per cent at ages 15–39, 4 per cent at ages 40–49, 10 per cent at ages 50–59, and 15 per cent at ages 60 and over.

The extra mortality associated with hypertension is considerable—much higher than the average for other impairments. The mortality ratio for New York Life substandard issues of 1954–70 observed to 1971 anniversaries that were rated solely for elevated blood pressure was 185 per cent based on the 1955–60 Select Basic Table. This may be com-

pared with a mortality ratio of 162 per cent for all cases that were substandard because of a single medical impairment.

This high mortality ratio reflects the increase in the relative importance of hypertension in the post-World War II as compared to the pre-World War II period. This probably can be explained by the virtual elimination of pre-World War II killers such as rheumatic heart disease, kidney disease, tuberculosis, and influenza, which reduced the level of standard mortality considerably. Because the number of extra deaths from hypertension has remained relatively unchanged, however, the percentage of extra mortality from elevated blood pressure has increased. This was not fully recognized until the results of the 1959 blood pressure study were published. In the previous 1939 study, mortality ratios had been considerably lower because elevated blood pressure extra mortality had been related to a much higher standard level.

As a result of the 1959 study, today's blood pressure ratings reflect to a much greater extent the extra mortality expected from borderline blood pressure. A comparison of current ratings of seven large companies showed that, at ages 40-49, debits for a blood pressure of 140/90, which is considered the upper limit of normal by many clinicians, varied from 20 to 35. Debits for blood pressures of 150/95, which would not be considered significant by many clinicians, varied from 80 to 115 among the seven companies. This illustrates the difference between the clinician's and the underwriter's viewpoint on the question of just what constitutes elevated blood pressure. This difference in attitude continues to be a major source of dissatisfaction among persons rated for hypertension. Many impairments such as overweight and diabetes are universally recognized by clinicians, underwriters, and laymen alike as requiring extra premiums for life insurance. Borderline elevated blood pressure does not have this same universal recognition.

Mortality ratios for a constant level of elevated blood pressure decrease somewhat by age. This pattern has recently been confirmed in a mortality survey (1948-66 experience) of the substandard risk portfolio of the Cologne Reinsurance Company and in the study of New York Life experience referred to previously. The New York Life study produced mortality ratios, for hypertension as the sole impairment, of 181 per cent at issue ages 15-29, 233 per cent at ages 30-39, 196 per cent at ages 40-49, 193 per cent at ages 50-59, and 147 per cent at ages 60 and over. For some reason this study and other studies have shown that the experience at ages 20-29 is generally more favorable than in the age span 30-59. Perhaps adverse experience at these younger issue ages does not emerge until the very long durations, or perhaps much of this elevated

blood pressure may be of an innocent variety which disappears with emotional maturity.

We know less about the behavior of excess mortality by duration. The pattern of the 1959 study, which produced mortality that was considerably higher in the first five policy years than in later years, was not confirmed by the Cologne and New York Life studies. The mortality by duration in the New York Life study was 184 per cent for policy years 1-2, 187 per cent for years 3-5, 195 per cent for years 6-10, and 169 per cent for years 11-17.

A recent report on the Framingham study (published in the April, 1971, *American Journal of Cardiology*) drew the following conclusion: "There is mounting evidence that many of the commonly accepted beliefs concerning hypertension and its cardiovascular consequence may be in error. The belief that systolic pressure is unimportant, that women tolerate hypertension well, that an elevated level of pressure is often a normal concomitant of aging and that labile hypertension is of little consequence all require reevaluation since there is little evidence to support these contentions and considerable reason to doubt them."

The conclusions regarding the significance of systolic pressure, the adverse effect of hypertension on women as well as on men, and the continued significance of elevated blood pressure at the older ages all support the findings of the 1959 study. On the other hand, the 1959 study did not provide data from which the effect of lability could be measured.

## II. PROBLEMS IN CLASSIFYING HYPERTENSIVE RISKS

The complexity of elevated blood pressure as an impairment creates numerous problems in classifying risks properly. Levels of blood pressure fluctuate radically, particularly in certain individuals, thus making it difficult to determine a representative blood pressure. This means that we prefer more than one reading before making an underwriting decision. If the readings differ by a significant amount, what weight should be assigned to each of the readings? Many companies average current readings; others give more weight to the higher readings. There is also a problem in determining how much relative weight to give past elevated readings in relation to current readings. Companies use direct averages, weighted averages, and other types of adjustments in solving this problem.

Because of these complexities, we have problems of acceptability. Applicants and agents are not ready to accept a rated policy if there has been no known prior indication of a blood pressure problem. They will claim that the blood pressure was up because the applicant rushed to

be on time for the appointment or did not get enough sleep the night before or had too many cups of coffee that morning, and so on. Many authorities claim that elevations at such times are, nevertheless, indicative of a hypertensive problem. Many agents try to avoid elevated blood pressures by arranging a morning appointment when the applicant is fresh and relaxed and by instructing him to get plenty of sleep the night before, avoid coffee, and get to the doctor's office well before the appointed time.

Even though an applicant may not dispute the level of his borderline blood pressure, he may resist the rating because of reassurances from his personal physician that he has no problem. Doctors often do not wish to alarm these borderline hypertensive patients.

Levels of blood pressure can be lowered dramatically by medication. This further complicates the problem of determining a representative average, in that we do not as yet have full information about the effect of treatment on mortality. There have been some studies, however, that indicate favorable results from treated blood pressure. Probably the most notable study on this subject is a Veterans Administration study by Dr. Edward Freis (*Transactions of the ALIMDA*, Vol. LIV). As part of this study, 380 male patients with diastolic blood pressures in the range of 90–114 mm. were divided into groups of approximately equal size. One group was given antihypertensive medication, and the other (the control group) was given placebos. In the postobservation period, which averaged three and a third years, 10 per cent of the control group died on account of cardiovascular complications, as compared with only 4 per cent in the treated group. Furthermore, 29 per cent of the control group developed significant complications, as compared with 12 per cent in the treated group. An additional 10 per cent of the patients in the control group had to be removed from the group because they developed elevations of diastolic blood pressure persisting above 124 mm. which made treatment mandatory. Dr. Freis concluded that "life-table analysis of these results indicated that the estimated risk of developing a major organic complication over a 5 year period in this group was reduced from 55% to 18% by treatment."

Many doctors remain unconvinced that borderline blood pressures are the cause of unfavorable morbidity and mortality and that sometimes there are unfavorable side effects from the medication. Doctors recognize that it is hard to persuade patients to follow a treatment regimen faithfully if they have not experienced any symptoms. A study by Dr. Howard McCue (*HOLUA Proceedings*, LIII, 67) showed that only a

shade more than 20 per cent of applicants rated for elevated blood pressure had some indication of treatment.

The underwriting of hypertension has become further complicated by the advent of paramedical examinations. Blood pressures appear to be higher on the average on paramedical than on medical examinations. A study of our own company experience showed that systolic blood pressures on paramedical averaged about 3 mm. higher than on medical examinations; for diastolic pressures, the average was about 2 mm. higher. In a recent study that contained a comparable number of paramedical and medical cases by age and amount, we found that more cases were issued substandard under paramedical than under medical. About half of the excess were cases rated for elevated blood pressure or a combination of overweight and elevated blood pressure.

A possible conclusion is that we are getting more exact blood pressures under paramedical. Whether or not these blood pressures are more representative for mortality purposes is questionable. The doctor may take additional blood pressures if the first one is elevated and then report those that he feels are representative, ignoring the initial high reading. We are not really sure whether blood pressures are more representative of true mortality with or without this preliminary underwriting judgment on the examiner's part. Even if we assume that blood pressure extra mortality will be lower under paramedical, we must also assume that extra mortality from other causes will be higher because of the less comprehensive examination. The net result may be the same level of mortality under both medical and paramedical.

### III. ELEVATED BLOOD PRESSURE—WHAT WE NEED TO KNOW

The 1976 blood pressure study, invitations to contribute data to which were recently sent by a liaison committee consisting of members of the Society of Actuaries and the Association of Life Insurance Medical Directors, provides an excellent opportunity for us to expand greatly our knowledge of the effect of hypertension on mortality.

The 1959 study failed to answer a number of questions. The study did not distinguish between cases where the reported readings were based entirely on current readings (i.e., those taken in connection with the insurance application) and those where the reported readings were based partly on elevated blood pressures in the applicant's medical history. It would seem desirable to ask companies to separate such cases. Those cases where current readings are lower than past readings fall into two categories: those due to blood pressure lability (i.e., a tendency in some individuals for blood pressures to fluctuate widely) and those due to

treatment. These cases also should be studied separately. The type of treatment should be recorded so as to distinguish between the milder drugs (e.g., diuretics, reserpine) and the more vigorously acting drugs.

In spite of the tremendous volume of data in the 1959 study, data for the higher elevations of blood pressure were insufficient. The reinsurance companies probably have substantially greater proportions of cases with these higher elevations and should be urged to contribute these data to the 1976 study, whether or not they can contribute their data for normal and borderline blood pressures. In the 1959 study very few data were contributed by the reinsurance companies.

The unexpectedly high mortality in the 1959 study at near normal ranges suggests that smaller subdivisions by level of readings be used (e.g., 138–142, 143–147 systolic instead of 138–147; and 88–90, 91–92 diastolic instead of 88–92). Data should also be compiled using the 1959 study subdivisions and the mortality base for the 1959 study, in order to facilitate comparison of the two studies.

In view of continuing medical developments, it would be desirable to separate data by years of issue. New York Life early-policy-year elevated blood pressure substandard experience of 1961–67 issues was much lower than that of 1954–60 issues. Part of this difference was due to rating tightenings made in 1961 to reflect the 1959 study results. However, I suspect that some of this difference may have been caused by a greater consciousness on the part of the medical profession of the effect of elevated blood pressure on mortality. The proposed 1976 study will observe issues of 1950–71 between 1954 and 1972 anniversaries. This experience, covering twenty-two issue years, should be studied separately by issue-year groups (i.e., 1950–55, 1956–60, 1961–65, and 1966–71).

With respect to minor impairments associated with hypertension, the 1959 study generally did not indicate that the minor impairments studied produced any excess mortality in combination with hypertension greater than the total of the expected extra mortality from each of the impairments separately. The single exception was nervousness, where there was virtually no extra mortality with normal blood pressure but about 25 points extra mortality with blood pressure at borderline levels. The reverse was true with respect to family history of cardiovascular-renal disease, where the excess mortality for cases with normal blood pressure was about 50 points but for cases with elevated blood pressure was virtually zero. This may suggest that efforts should not be concentrated on compiling data on experience with specific minor impairments at the expense of compiling more needed information.

## IV. CHOLESTEROL

Although we know much about the effect on mortality of elevated blood pressure, we know relatively little about elevated cholesterol. There are reports, however, that demonstrate a direct correlation between elevated mortality and elevated cholesterol and show that such excess mortality is due primarily to the incidence of coronary artery disease among persons with elevated cholesterol.

A recent Framingham study report (published in the January, 1971, *Annals of Internal Medicine*) concluded: "In men the moderately elevated cholesterol values commonly encountered in the general population are associated with increased risk of coronary heart disease. Elevated endogenous triglyceride values appear significant in coronary atherogenesis only when accompanied by high cholesterol values." The report states further that "in older women, on the other hand, a fasting triglyceride may be the only lipid capable of prognosticating coronary heart disease."

A recent report based on fifteen years of experience in the Los Angeles heart study (*Journal of Chronic Diseases*, Vol. XXIII [1971]) indicated that the "incidence of myocardial infarction is highest wherever the cholesterol level is high." This report also indicated that "there is no increased risk of myocardial infarction with hypertension." The reverse is true with respect to the incidence of stroke, where there is a high correlation with hypertension and a low correlation with elevated cholesterol.

Although a correlation between elevated cholesterol and extra mortality has been demonstrated, it has not yet been proved to the satisfaction of all whether the extra mortality is caused by the cholesterol or whether it is an incidental finding in a group that experiences excess mortality for other reasons. Moreover, some of those who concede that cholesterol is a cause of the high mortality feel that it is discriminatory for companies to rate for random or accidental findings reported by attending physicians.

Very few companies test routinely for cholesterol, even at higher amounts, although some obtain SMA 12 blood tests on paramedical examinations. One reason for not obtaining routine tests is the relative difficulty of drawing a blood sample of sufficient size and testing the results.

In a recent survey of forty-two companies, however, it appears that very few companies ignore a finding of elevated cholesterol. Twenty-six of the forty-two companies have specific rating schedules. Of the re-

maining sixteen companies, only two definitely would ignore a high cholesterol reading, although three others did not say specifically whether or not an elevated reading would be ignored. Although most companies rate for cholesterol, the experience of the Framingham study, which shows significant extra mortality when the cholesterol level exceeds 250 mg. per cent, is not closely followed. Only one company rates for readings under 300 mg. per cent, and most companies do not rate until readings reach 350 mg. per cent.

#### V. CONCLUSION

Probably our greatest challenge in future medical impairment mortality studies will be to isolate elements of the cardiac profile from one another. By cardiac profile, I mean those factors that generally are considered to have a high correlation with coronary disease: family history of coronary disease or diabetes, smoking, sedentary habits, nervous stress, overweight, elevated blood pressure and elevated blood sugar, cholesterol, and triglycerides. Although practical limitations from an expense standpoint make this a difficult problem, companies should be urged to record this information, whenever available, so that data can be tabulated in an intercompany study at the earliest possible date. If we can help to demonstrate the adverse effect of cholesterol—and perhaps other factors in the cardiac profile—through life insurance mortality statistics, we can add significantly to medical knowledge, in addition to evaluating life insurance risks more properly.

**MR. WILLIAM L. BOGARDUS:** Persons with diabetes mellitus comprise about 2.5 per cent of the population of the United States and Canada, and only about one-half of these people know that they have the disease. About 70 per cent of the diabetics are between ages 20 and 60, the principal insurance-buying ages. It is only natural for insurance companies to want to offer life insurance on an acceptable basis to such persons.

The Lincoln National has been offering life insurance to diabetics since 1946. The selection criteria were not unreasonably restrictive; this allowed us to cover more people and thereby evaluate more of the factors which affect the risk. Our initial offerings were based on rather crude statistical data, and it was anticipated that periodic studies would be required to enable us to determine more precisely the principal factors which influence mortality among diabetics and the relative significance of each factor, whether that factor was studied alone or in combination with other factors.

Continuing studies have been carried on, and we have reported the findings to the industry. The most recent report was given by Dr. John Barch in May, 1971, to the Home Office Life Underwriters Association. That 1971 report was the second major paper on insured diabetics presented by Lincoln National, and it covered issues of 1946-65, traced to policy anniversaries in 1966 or to prior termination. That report covered a total exposure of 88,000 policy years and 1,300 claims. Perhaps it is important to point out that the Lincoln's investigations of mortality among diabetics have been conducted from mortality records which are considerably more complete in terms of the information gathered about each risk than mortality records typically used in mortality investigations. It was felt that this expanded record was necessary to permit investigation of each of the factors influencing mortality among diabetics. With that in mind, consider the more specific conclusions reached in our 1971 study:

1. The single most significant factor influencing mortality among diabetics is the age at diagnosis: the younger the age at diagnosis, the more unfavorable the risk.
2. Diabetics treated by diet alone and those treated by diet and an oral hypoglycemic agent showed similar mortality ratios. These ratios were significantly lower than those for diabetics treated by insulin.
3. Underweight and overweight are both unfavorable findings.
4. Albuminuria, not necessarily in large amounts, is an extremely unfavorable sign.

Because the 1971 study indicated extremely high mortality ratios among those individuals whose diabetes was diagnosed prior to age 20, we felt that further investigation of these risks was in order. The class of insured diabetics showed an over-all ratio of actual to expected mortality of 660 per cent; corresponding mortality ratios for older ages ranged from 430 to 233 per cent. The results of our further investigation into the mortality experience among diabetics whose diabetes was diagnosed prior to age 20 are the subject of our discussion today.

Our 1971 study had shown that diabetics who had their diabetes diagnosed prior to age 20 and who had been accepted for insurance from seven to twelve years following that diagnosis experienced a much higher mortality ratio, namely, 918 per cent. It appeared evident that the mortality ratios were a function of *both* age at diagnosis *and* the total duration of the disease. Therefore, we attempted to quantify the incidence of mortality according to these parameters to determine the true underlying mortality pattern.

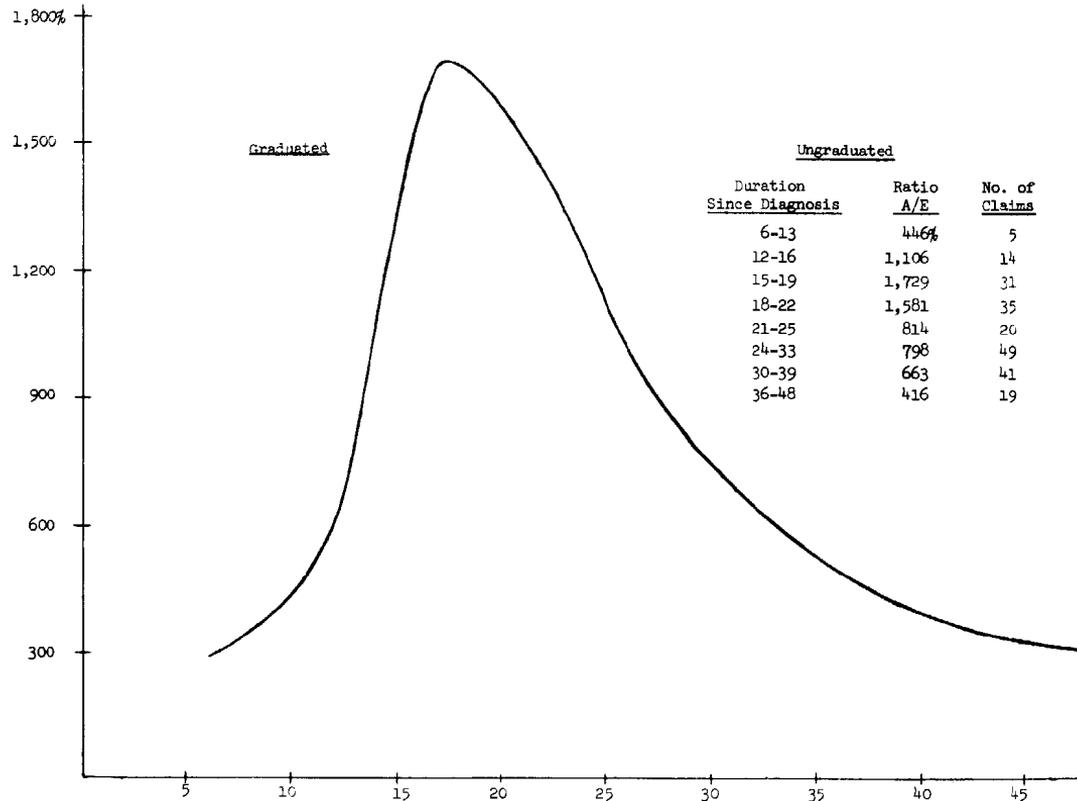


Fig. 1.—Mortality ratios by duration of diabetes since diagnosis: general cases excluding no-insulin and borderline blood pressure cases; ages 0–19 at diagnosis, policy durations 6–24. *Ordinate*: ratio of actual to expected deaths; *abscissa*: duration (in years) of diabetes since diagnosis.

The group of diabetics whose disease was diagnosed prior to age 20 was re-examined by updating the experience reported by Dr. Barch. Only diabetics who were treated by both insulin and diet and who showed no significant complications of diabetes or any major impairment in addition to the diabetes were studied. Furthermore, the first five policy durations were excluded because they reflected "superselect" mortality and would obscure the true influence of the total duration of the disease on the mortality ratios. This updated experience included a total exposure of 13,052 policy years and 214 claims.

The experience by duration since diagnosis exhibited rather shocking mortality ratios. The ratios rise sharply with increase in total duration of the disease, peaking between fifteen and twenty years following diagnosis at over 1,700 per cent of standard expected mortality. After reaching this peak, the mortality ratios decrease sharply and appear to level off between forty and fifty years after diagnosis, as shown in Figure 1. Among the deaths occurring between twelve and twenty-five years after diagnosis, more than half were attributable to kidney disease or diabetes.

Although we realized that the results of our investigation must be viewed with the cautions that are part of any mortality investigation, we felt that the results were significant. These results, both the level and the pattern of the mortality ratios by total duration since diagnosis, present unusual problems in underwriting and pricing. The solution to these problems involves an integration of the statistical findings with actuarial and clinical judgment.

## APPENDIX

### A. MATERIAL STUDIED

The material studied is similar to the group of general cases reported by Dr. Barch in 1971, except for the following:

1. Issues of 1966-69 and exposures between policy anniversaries in 1966 and 1970 were added to the investigation.
2. Cases with borderline blood pressure and those not treated by both diet and insulin were excluded because of the possibly confounding influence of these factors on the mortality ratios.
3. Policy durations 1-5 were removed because these durations reflected "superselect" mortality, that is, mortality ratios sharply lower than those experienced at the higher durations. The "superselect" mortality tended to obscure the influence on the mortality ratios of the total number of years elapsed since diagnosis.

The material studied involved specially coded mortality records to permit a continuing mortality investigation of the pertinent risk factors associated

with diabetes. It should be noted that the mortality findings are not necessarily strictly a function of the parameters investigated but also reflect the selection criteria for underwriting and, perhaps equally important, the study criteria for classification of general cases.

#### B. GRADUATION METHOD

The ratios of actual to standard expected mortality were graduated by the graphic method. Both the graduated and ungraduated ratios are shown in Figure 1. It should be noted that the ungraduated ratios are flawed to an unknown degree, because there is some overlapping of durations since diagnosis between adjacent intervals of durations studied. Moreover, it should be recognized that the tails of the curve reflect primarily the judgment of the graduator, since sufficient mortality data in these areas are lacking.

#### C. BASIS OF STANDARD EXPECTED MORTALITY

The mortality rates used in calculating the standard expected mortality for this study were derived from intercompany experience for the same policy durations and approximately the same calendar years as those covered by the study. The intercompany experience used is based on standard medically examined business for the first fifteen policy years and on all standard business, medical and nonmedical, for policy years after the fifteenth, as published in the *Transactions of the Actuarial Society of America* and the *Transactions of the Society of Actuaries*.

MR. CHARLES A. WITTENBERG: The morals of our country have changed noticeably during the last decade. This has added to the difficulty of accurate mortality measurement. Underwriters are attempting to evaluate risks today on the total risk basis. If it is apparent that earlier-than-expected mortality will be experienced, the proposed insured will be rated or possibly declined. The underwriter must attempt to determine the effect that a given life style has on mortality. Moral risks range over a broad category. Some of the more common situations encountered by the underwriter in everyday case review can include extramarital or homosexual relationships, reckless driving, drug use, and the avoidance of true and complete disclosure in the papers submitted.

An underwriter has many available sources to inform him of adverse situations. If the agent and the client have used candor in the submission of the problem, the underwriter will have an easier time making an appraisal. In general, if critical information known by the client and/or agent and not admitted in the papers is developed through outside sources, a more cautious underwriting approach will be taken. In some cases, if the nonadmitted information is material enough, it will suggest to the underwriter that he decline the application.

In the area of disability income and medical expense insurance the evaluation of any moral hazard present is especially critical. Not only can health be impaired by some of these hazards, but the possibility of fraudulent claims is also present. Individuals who have demonstrated a lack of responsibility or integrity in their business and personal life could show a similar lack of integrity in filing claims.

There are many varieties of moral hazards to consider, and, in general, the underwriter attempts to put together the full and complete story. In the following areas I will present Continental Assurance's viewpoint and underwriting action on health and life insurance coverage.

#### I. HEALTH INSURANCE

##### A. *Alcohol*

Continental will not consider members of Alcoholics Anonymous for health insurance until they have been abstainers for a minimum of three to five years. At that, they probably will be considered only on a substandard basis. Non-AA members who drink to excess are evaluated on an individual basis, and rejections are likely for problem drinkers.

##### B. *Driving Record*

A bad driving record could result in rejection of a risk, charging of a substandard premium, or, in the case of disability income, an increase in the elimination period. A history of several accidents combined with recent and frequent violations would most likely call for rejection. If the applicant combines a poor driving record with a drinking problem, rejection is certain.

##### C. *Criminal Activities*

Applicants with prison records who are no longer on parole and who have shown by their work record and family stability to have reformed can often be taken as standard. Applicants who are still on parole will require individual consideration.

##### D. *Drugs*

At the present time applicants who are current users or who have a history of recent or extensive use of drugs eliminate themselves from consideration for any personal health coverage. Although complete rehabilitation from the use of hard drugs is rare, in the case of a good record and a stable home life, consideration may be given on a substandard basis. Those who admit to experimenting with marijuana but are no longer using it may be considered for possible standard coverage.

### *E. Homosexual Relationships*

Although medical expense reimbursement policies would probably be issued standard, disability income policies probably would be substandard or reject.

## II. LIFE INSURANCE

In the life insurance area the identification and classification of cases relative to habits is one of the most difficult underwriting tasks. Alcohol or drug abuse has an adverse effect on mortality. The underwriter must be alert for the existence of clues in the areas of home life, business associations, and health and psychological outlooks. Sources of such information may be inspection records, medical examinations, and attending doctor's statements. The important thing is that all questionable areas be satisfactorily explained.

### *A. Alcohol*

Business convention, anniversary, and social drinking to a mild degree will usually be issued on a standard basis. Medical examinations and inspection reports are required on all cases. The problem drinker will probably be classed from \$5 per thousand on up to declination. The "spree" type of drinker is usually considered a declination. Sources of information may be work records, attending doctor's statements, and motor vehicle bureau reports.

Some members of AA may qualify for life insurance if it can be established that they have abstained from drinking for a minimum of one year. Minimum ratings will be \$10–\$15 per thousand, depending on factors including age, environment, and the medical aspects. After six years of abstinence, standard coverage is possible.

### *B. Drugs*

The underwriting of cases dealing with illegal drug use has been very much of a rarity in past years. Current studies confirm that both use and abuse of drugs are increasing at an alarming rate. Unfortunately, statistics dealing with the effects of prolonged use of depressant, stimulant, narcotic, or hallucinogenic drugs are both limited and conflicting. This increases the difficulty of making a proper appraisal. Classification of a drug abuser is possible if special consideration is given to facts regarding the applicant's age, occupation, economic level, social level, type of drug use, period of use, time since last use, and sources and completeness of information available. Each case will be examined on its own merits, and there are very few hard and fast rules.

Cases that involve current or very recent drug use will be declined. Select cases of past use, considered cured for a minimum of three years, will probably be rated \$5 per thousand and up. If the analysis reveals additional physical, social, or emotional problems, the case will be declined. Both medical and inspection reports will be required in all cases. A history of occasional or experimental use of marijuana requires careful investigation, and in most cases coverage will be offered. Select cases may be issued at standard rates, with other cases classified at \$5-\$10 per thousand. Inspections will be required on all such cases.

### C. *Homosexual Relationships*

If there is a stable work situation and no adverse findings as to location, neighborhood, or age of applicant, insurance probably could be issued in modest amounts, possibly even standard. Designation of the other partner as beneficiary probably would cause no additional problem.

### III. COMMENTARY ON PRESENT PRACTICE

Present underwriting analysis tends to suggest that the only time drug abuse is revealed during an underwriting appraisal is when it is picked up from the inspection, and then usually by reference to police records. Several questions come to mind: Are we unknowingly insuring many drug abusers? Is there a better means for us to detect drug abusers? Is it economical? If we can detect them, how do we evaluate drug abusers in terms of substandard mortality? One insurance company estimates that three out of every four industrial plants employing more than fifty people may be considered to have a drug abuse problem. If that is true, then anyone actively soliciting insurance from such an industrial source might be considered to be insuring individuals with a drug problem. Although it has been mainly the younger employees who have been using drugs, the involvement has included white-collar workers, assembly line workers, and middle-aged blacks and whites. A 1970 survey conducted in New York State by the Narcotic Addiction Control Commission indicated the following: (1) Some 12.1 per cent of all employed workers have smoked marijuana. Some 4 per cent of all employed workers are currently regular users of marijuana, and one-fourth of these regular users report smoking marijuana while on the job. (2) Some 1.3 per cent of all employed workers have used heroin on at least one occasion. Some 0.5 per cent of all employed workers are currently regular users of heroin, and one-third of these users report the use of heroin on the job. (3) Some 2.6 per cent of all employed workers have used LSD on at least one occasion. Some 0.3 per cent are currently regular users, one-fifth of

whom report the use of LSD while on the job. (4) Some 2 per cent of all employed workers have used methedrine (speed) on at least one occasion. Some 0.1 per cent of all employed workers are currently regular users of speed, and almost two-thirds of these regular users report the use of speed while on the job.

It appears that the principal market for the world's illicit drugs is the North American continent. How many of our applicants for life insurance coverage have been involved with drug abuse? As far as I have been able to determine, there are no reliable statistics on this subject. It is my opinion that we are not yet insuring, knowingly or unknowingly, many drug abusers. On the other hand, our methods for detecting abusers via the routine underwriting investigation are almost negligible. Some companies have included a question on their applications as to whether or not certain drugs have been used other than as prescribed by a physician. I doubt very much whether there are many positive responses to this type of questioning and feel that the real intent of the question is to establish a basis for contesting a claim.

Continental recently has added a drug use question to its individual health application. In addition, some laboratories make available drug screening tests run on a urine specimen which can determine the presence of some drugs on one level of screening and determine the specific drug as well as the amount of the drug present on another level of screening. These screening tests tend to be expensive and probably suggest a use where there is a valid need for coverage. Such tests may indicate to the underwriter that a drug problem may exist or may prove helpful on some very large cases involving certain segments of entertainment and other professions where there may be a high incidence of drug use. Some large employers have established rather sophisticated drug screening methods in their new employee hiring programs.

#### IV. RESULTS OF CURRENT PRACTICE

Our claims department advises me that there are very few death claims where the cause of death is given as drug overdose. It is possible that there may be a reluctance on the part of some doctors to give this reason as a cause of death. Looking back through our claims over the last year, we turned up only two where there was reasonably good correlation with a drug overdose. In one case we denied payment on an accidental death, and in the other we paid the life amount, since we had no exclusions.

In 1970 the International Claim Association published a report of its law committee entitled *Claims Related to the Use of Drugs*. This

particular publication lists some of the legal decisions resulting from claims involving both pharmaceutical drugs and illicit drugs. One of the principal items reviewed in these cases indicates exclusions in various contracts and the reliance upon the general definition of accidents and accidental means and the general defense of assumption of risk. With regard to the latter point, the question arises as to whether the taking of any narcotic is more of a risk than drinking when driving.

Another good source of information is the paper entitled "Underwriting Drug Abuse" given at the Western Home Office Underwriters Association in June, 1970, by Ronald H. Secrist. This paper states very clearly the underwriting and mortality problem associated with drug use and reviews specific drugs and their effects. The then current underwriting approaches to the drug problem, assembled from a survey of seventy-one companies, was included in this paper.

Another statement of underwriting problems can be found in an article entitled "The New Mortality," published in the 1970 *Proceedings of the Institute of Home Office Underwriters*. This is a discussion, largely general in nature, including a current application containing a drug questionnaire.

For a further discussion and a 1972 survey of some underwriting opinions, the March issue of *Best's Review* contains an article by Lloyd Levin entitled "Life Styles." A portion of his article concerns itself with underwriting implications of an increase in drug use, and the other part deals primarily with underwriting problems concerned with risks on co-habitational units.

MR. WILLIAM A. FEENEY: I would like to present for your consideration some thoughts on the subject of individual disability income underwriting amount limits in relation to the applicant's earnings.

Average earnings of prospects for this type of insurance have been increasing steadily because of inflation and other factors, and we are all aware of agents' demands for ever higher issue and participation limits to meet the need for income replacement in the event of disability. This is a legitimate demand, and we are in the business to meet valid insurance needs; at the same time, as actuaries we must be conscious of lessons learned from past experience and be guided by common sense, without skimping on prudence. The main problem as I see it is to maintain a proper balance between disability benefits from all sources and the insured's expected earnings at the time disability starts, so that there always is a financial incentive to return to work and minimal inducement to malingering. My comments this morning will be addressed primar-

ily to this problem, with a particular focus on the complication introduced by the recent changes in social security disability benefits.

In a review of the social security benefits now available, it becomes clear that these benefits have become a more significant factor and should be considered seriously in determining what benefits can be issued without creating overinsurance. This is particularly evident for young married persons having dependents and low or moderate incomes. Our examination was based on the results of a small computer program designed to develop the amount of "needed income" required for a person to continue unchanged his predisability standard of living. The program takes into account federal income taxes, social security taxes,

TABLE 1  
PROJECTED EARNINGS FOR 1978 AND "NEEDED INCOME" TO  
MAINTAIN PREDISABILITY STANDARD OF LIVING

ANNUAL EARNINGS IN 1973	PROJECTED EARNINGS IN 1978	MONTHLY "NEEDED INCOME"		
		MARRIED* AGED 25	SINGLE AGED 25	MARRIED* AGED 45
\$ 10,000.....	\$ 13,400	\$ 130	\$ 370	\$ 290
12,000.....	16,100	280	520	450
14,000.....	18,700	440	660	610
16,000.....	21,400	610	810	780
22,000.....	29,400	1,070	1,220	1,230
30,000.....	40,100	1,630	1,720	1,800
40,000.....	53,500	2,330	2,320	2,500
60,000.....	80,300	3,540	3,340	3,710
80,000.....	107,100	4,730	4,330	4,890
100,000.....	133,800	5,880	5,300	6,050

\* With dependent wife and two children.

work-related expenses, growth in earnings at the rate of 6 per cent a year, and the social security disability benefit computed in accordance with current and previous formulas. This was done on an average basis, but separately for each earnings level, and recognizing marital status, age at issue, and assumed age at commencement of disability.

Table 1 shows the picture as it emerges for married and single persons aged 25 in 1973, and for married persons aged 45 in 1973, who are assumed to become disabled in 1978. Projected earnings are shown for 1978, as well as the amount of "needed income" to maintain the predisability standard of living after allowing for all the above factors.

What is missing from the table is, I believe, a key factor in underwriting this business—namely, that we should not be willing to insure

an applicant for the full amount of his "needed income." To do so would allow him to continue unchanged his predisability standard of living and remove the financial incentive to return to work. The amount insured should be something less than the "needed income," and underwriting judgments will differ as to what this incentive margin should be. We were rather disturbed to find that if an incentive margin as low as 10 per cent of predisability earnings were allowed for, the table indicates that we should not be selling our minimum amount policy (of \$200 monthly income benefit) to young married persons having dependents and earning less than \$13,000 a year. The studies do indicate that graduation of issue limits by age is appropriate for married persons, and higher limits can be made available to single persons. The latter is risky, however, since the marital situation for younger people can change quickly after issue.

As I said, I believe there is a potentially serious problem here relative to the general issue and participation limits which now prevail in the industry. Social security disability benefits are substantial now, and there is always the possibility of future liberalizations. On the other hand, there are considerations which serve to mitigate the risk, such as the following:

1. The social security disability benefit is not available until after five months of disability, and then only under rather stiff standards, including a provision that the disability is expected to last at least a year. Such a long waiting period might discourage most malingering.
2. It may be that during an extended disability the insured incurs additional expenses, such as medical charges not reimbursed through insurance, which could reduce the overinsurance problem.
3. A young married man at the outset of his career is not likely to malingering and should be anxious to get back on the job as soon as possible.

The proper weighting that should be given these various factors in assessing the underwriting risk is, I believe, an important element.

Also, to stimulate discussion and without attempting to provide answers, I have a number of other questions you may wish to consider:

1. If a 10-15 per cent financial incentive margin is appropriate for applicants with low earnings, what should the incentive margin be for applicants with higher earnings who may be applying for disability insurance with a potential claim liability in excess of \$1,000,000?
2. To what extent should issue limits in relation to earnings reflect reduced after-disability income needs of applicants who
  - a) Live in states such as New York, California, and Hawaii, with high state income taxes, and perhaps with city income taxes as well? or

- b*) Are self-employed and so were paying a higher social security tax before disability?
3. How should unearned income be counted in determining an appropriate issue limit?
4. What special problems exist when both husband and wife are working?
5. What problems are we confronted with in insuring women for disability benefits? Recent developments in Pennsylvania, New York, and other states suggest that if you have not already moved in the direction of making the same policy benefits and underwriting limits available to women as to men, you may soon be required to do so.
6. Is there a practical way of overcoming the potential overinsurance problem created by the substantial disability benefits being included in automobile no-fault laws?

One final thought: since we are concerned with establishing a proper relationship between the applicant's earnings and the amount of disability insurance to be issued, is it not of vital importance to secure accurate information as to these earnings? Those of you who are not already doing so may wish to consider the advisability of including on the application a direct question as to earnings, including unearned income and any significant changes in earnings in recent years.

#### *San Francisco Regional Meeting*

CHAIRMAN CHARLES A. ORMSBY: Underwriting management, as we all know, has the dual responsibility of creating an image of excellence in service to the field and of managing the underwriting function to ensure a satisfactory level of mortality in relation to the expenses incurred in obtaining and processing underwriting information.

We in underwriting management together with our actuarial associates must chart a course which will facilitate our responding successfully to major changes in the environment in which our business is conducted. Significant developments have appeared in recent years which vitally affect the future of the life insurance industry. These include inflation, affluence, population shifts, growth in financial services, the increased sophistication of the public with respect to financial matters, the far-reaching implications of liberalizations in our social security program, changes in life styles, consumerism, and so forth.

In this session we will be considering four subdivisions of the present home office underwriting scene which constitute a good cross-section of the current developments in this area of our operation.

The last intercompany study of build and blood pressure (among insured lives) was based on issues of 1935-53, exposed from policy anni-

versaries in 1935 through anniversaries in 1954. There is a rapidly spreading impression that the life insurance industry should develop more recent experience data on these two most common underwriting factors in rating applicants. Since the publication of the 1959 build and blood pressure study, many additional questions regarding the effects of abnormal build and/or blood pressure on longevity have been raised but not answered definitively, the most common perhaps being the question of what credits should be allowed by the underwriter for the successful treatment of high blood pressure.

One reason hypertension is on our agenda today is that the industry does have exciting plans for a new intercompany study of the effects of hypertension on mortality. Invitations to participate in this study were recently sent out by a liaison committee of the Society of Actuaries and the Association of Life Insurance Medical Directors.

[EDITOR'S NOTE.—The discussion of "Physical factors: hypertension, cholesterol" which followed was essentially the same as that given by Mr. Harry A. Woodman, Jr., at the St. Paul regional meeting (p. D229).]

MR. MARTIN L. ZEFFERT: It has been our experience over the past few years that decided differences in underwriting philosophy exist between most of the reinsurance companies and a handful of other reinsurance companies, including some foreign-sponsored enterprises. The difference surfaces principally in the ratings applied to cardiovascular-renal impairments, and they are persistent enough so that they simply cannot be ignored or dismissed as an occasional fluctuation in underwriting judgment.

We have found that what is 500 per cent in my own company, and in our two principal reinsurers, typically is 300 per cent or less in other companies. There seems to be little difference in underwriting between my company and its old-line reinsurers, but the three of us find ourselves quite a distance from the alternate high-risk company.

With the recognition that European experience appears to differ from that of North America, it is still a difficult situation to explain to your agents, who seek coverage for their clients and earnings for themselves. In view of the cost of reinsurance, excessive use of the facility is not practical for any life insurance company, but the pressure to reinsure at the ostensibly lower ratings is almost impossible to handle.

We all hope that the 1976 build and blood pressure study will provide some resolution of these differentials and perhaps provide us with some more consistent view of the same case.

CHAIRMAN ORMSBY: Our profession for some time now has been in need of more data on the many questions one meets in passing upon an application from a diabetic. Only a cursory comparison of the underwriting manuals of a few representative companies brings clearly to the fore an interesting variety of approaches to the guidelines used to classify diabetics applying for life or personal health insurance. We should be aware that there has never been an intercompany study of the effects of diabetes on the mortality of insured lives. It is also relevant to note here, as brought out by Dr. Entmacher of the Metropolitan in one of his recent papers, that “the underwriting of diabetics has undergone great change since the 1940’s when coverage was first offered.”

[EDITOR’S NOTE.—The discussion of “Diabetics” which followed was the same as that given by Mr. William L. Bogardus at the St. Paul regional meeting (p. D236).]

MR. GEORGE W. CHALMERS: I have little to say about morals in the sexual sense, since I know of no statistical study on the mortality implications of divorce, cohabitation, promiscuity, or homosexuality. However, we are always in the middle of changing life styles. In *Best’s Review* in 1972, Lloyd M. Levin stated,

A permissive society, a growing women’s lib movement, wars, the Pill, education, communications and the acceptance of divorce as a way of life, along with the breakdown of social and racial barriers, may be just a few of the factors contributing to the increased popularity of cohabitation as a life-style. . . . The last study I saw estimated that by 1975 one-third of the age group 18–35 will cohabit without marrying . . . the cohabitators, the people living in communes, the marijuana smokers, as well as the unwed mothers, homosexuals, divorced persons, swingers, and women undergoing abortion will comprise the majority of people in the 18 to 35 age group of 1975 and after.

This, of course, is difficult to prove or disprove, since only time will tell. But, meantime, the home office underwriter will be called upon increasingly to exercise judgment with little or no statistical backing, and increasingly we will be insuring these people without even being aware that we are doing so.

Another aspect of morals could be ethics and financial speculation. It has been increasingly obvious that on large creditor and/or jumbo personal insurance there have been implications of fraud and underworld speculation. It is most important to know all about the purpose of the insurance, the finances, and the reputation not only of the borrower but of any creditor.

Chester Barney, former vice-president, underwriting, of the American United Life, presented a paper entitled "The Problem of Alcohol" to the Home Office Underwriters Club of the Western States in San Francisco on June 8, 1959, exactly fourteen years ago. His paper had virtually no statistical material but was a philosophical plea to get away from the then prevalent idea that "anyone who drinks is a potential alcoholic." He stated, "Alcohol may be less of a problem than the person who uses it." This is similar to the idea that "the greatest danger in automobiles is the driver." An underwriter has to remain objective and professional, and it is very difficult indeed to avoid undue severity or undue liberalism on such subjective matters as alcohol and drugs. Shepherd and Webster, in *Selection of Risks*, chapter 5, drew attention to the need to measure risks and not to sit in moral judgment and made the enlightened (for 1959) statement, "We are not concerned with a proposed insured who uses alcoholic beverages moderately on social occasions as that is an accepted part of our way of life." The same authors dismissed drugs in three sentences, ending: "if confirmed, the case is unacceptable."

Ronald H. Secrist, in a fairly recent paper entitled "Underwriting Drug Abuse," polled seventy-one companies and had about fifty usable replies. I have summarized the results of the poll as follows: Only one company had a special method of obtaining information on drug abuse; 75-85 per cent of the companies varied their underwriting according to type of drug, frequency of use, socioeconomic background, occupational status and type; forty out of forty-nine companies would give standard insurance to a young student who used marijuana experimentally two and a half years ago, while three companies declined. However, in the case of a student (good family) currently using marijuana, thirty companies would decline, the remainder varying from standard all the way to 500 per cent. To a programmer, aged 23, who used marijuana and amphetamines experimentally up to six months ago, three companies would give standard, while another twenty-nine companies ranged from 150 to 500 per cent, with fourteen of these at 200 per cent. Forty-seven companies declined a student using all drugs including heroin, while forty-six declined and one quoted 250 per cent to a college instructor regularly using LSD and amphetamines.

The chief difficulty of course, is, to obtain disclosure in the first place. Any question regarding drugs or alcohol has to be worded very carefully to obtain state insurance department approval, and then, of course, it has to be answered honestly. Most companies with such a question on drugs report less than a 1 per cent answer rate; one very large company

had a rate of 0.5 per cent. Since disclosure is so rare, it seems that we may be insuring social drug users in the same way that we have unknowingly insured alcohol users. The February, 1972, *Metropolitan Life Statistical Bulletin* gives figures for narcotic-related deaths in New York City for the period 1960–71, and for drug deaths among Metropolitan standard policyholders in 1971. However, the data are not related to any exposure, and, moreover, many accidental drug deaths may be suspect as having arisen not by accident. In brief, I feel that we are at the stage where the life style has changed to include social drugs, just as Chester Barney felt fourteen or more years ago that the life style condoned social drinking. Various social outcries, and official committee reports to legalize possession or distribution of marijuana, have been recorded both in the United States and in Canada. So far, legislative bodies in both countries have resisted permissive legislation and have been supported in this attitude by the medical profession. What we may have to do now and in the future, if our sources of information improve enough for us to do so, is to distinguish the personality behind the drugs, sort out the social drug users from the problem drug users and those using both drugs and alcohol. Indications in Ontario high schools are, incidentally, that the drug scene may have peaked. Alcohol and tobacco consumption has increased dramatically (70 and 38 per cent, respectively), and marijuana about 21 per cent, but glue, speed, and LSD have decreased, and opiates still remain at less than 2 per cent.

There is so much written about alcohol that I will not philosophize. I will refer you to Mr. Menge's paper, quoted in Shepherd and Webster, chapter 5, or the paper by Karl Davies in May, 1965 (*HOLUA Proceedings*), and I will introduce some new figures from a study by Wolfgang Schmidt and Jan de Lint of the Addiction Research Foundation of Ontario. This is a paper entitled "Causes of Death of Alcoholics," reprinted from the March, 1972, *Quarterly Journal* edited by the Rutgers University Center of Alcohol Studies. The published summary reads in part: "The ratio of observed to expected deaths from all causes was 202 per cent for men and 319 per cent for women alcoholics in a Toronto sample." Although the case material studied included males and females who sought treatment at the Toronto clinic, and therefore does not represent an insurance population, I think it bears some similarities to one and may be useful as extrapolatory material. Karl Davies mentioned that we always seem to rate alcohol cases 25 or 50 points too low because of nondisclosure, or whitewashing, or our own reluctance to believe the worst. If so, our insurance population of problem drinkers may not

be too different from the Toronto clinic population. Even given that the Davies and Toronto studies are quite dissimilar in base tables and methods of measuring exposure and classifying deaths, the following comparisons nevertheless are interesting.

In the Equitable study of 149 deaths, 109 occurred among persons not under treatment, with no other impairments, whose last drinking episode was within two years, between 1940 and 1961. In the Toronto clinic, 5,359 men and 1,119 women who sought treatment between 1951 and 1963 produced 639 male deaths and 99 female deaths (general state of health otherwise unknown). By percentage cause of death, the results were as shown below:

	EQUITABLE	TORONTO CLINIC	
		Males	Females
Arteriosclerotic heart disease.....	38%	37%	29%
Other cardiovascular-renal disease.....	9	4	9
Malignant neoplasms.....	21	12	10
Digestive system diseases.....	6	10	13
Accidents, suicide, homicide.....	18	17	21
Other, including pneumonia and alcoholism.....	8	20	18

Apart from different emphasis between the malignancies and the other-causes category, there is a reasonable similarity.

By age grouping, the mortality ratios were as follows:

AGE GROUP	EQUITABLE (POLICY YEAR)	TORONTO CLINIC (YEAR OF AGE PASSED THROUGH)	
		Males	Females
10-39.....	341%	310%	700%
40-49.....	238	334	573
50 and over.....	293	163	193
Ages 10 and over.....	278%	202%	319%

I believe that the female ratios were compared with a very light base table. It could support a hypothesis that selection of alcoholic risks by the underwriter is no better than self-selection by the cases themselves (by attending a clinic or applying for insurance).

MR. ORLO R. KARSTEN, JR.: My purpose today is to start a discussion, not to give one. I hope to stimulate your thinking, not add to your store of knowledge.

In your opinion, as an actuary, what should be the relationship between the income earned by the person insured and disability benefits which can be paid to his or her dependents? As you think of your own response to this question, I would like to direct your thoughts to amount or participation limits, the degree to which you are influenced by the practices of other companies, the consideration given to income which is not earned, the degree to which you are willing to insure potential income, and any emerging trends which you perceive as distinct departures from known practices.

First, what do you consider a reasonable maximum limit of participation? Looking around the room, I would judge that less than half of us lived through the Great Depression, and very few were then employed by companies which actually paid out all those disability claim dollars. To most of us the trauma of the twenties and thirties is written only in the history books, or perhaps in some company's books but not necessarily our own.

The lessons of history are clear in the actuarial literature. As the traditional conservators of the insurance business, we actuaries are charged with the responsibility of avoiding past mistakes. One of these mistakes in the 1920's was a failure to recognize the dangers of over-insurance, particularly the misdirection of disability benefits in funding early retirement. It was a time when a man carrying substantial income disability benefits, perhaps in his late fifties, who had either failing health or a failing business or both decided to "retire," using his disability benefit in lieu of a pension.

This was never anticipated, but it happened. Our industry reacted by limiting its exposure, in the total disability benefit offered to any one person. Participation limits came into being.

Some twenty years after the depths of the Great Depression, life companies would still offer only \$300 monthly income disability benefit. In the early 1950's, that was a typical participation limit. Coverage was usually held to one-half of earned income, so only those persons with \$600 monthly earned income could obtain a company's full participation limit. In that era, about twenty years ago, 30 per cent of wage earners had incomes of \$600 or more. It would seem that our industry then offered coverage to only 70 per cent of its potential market.

By the early 1970's, the percentages had reversed; 70 per cent of the working population was paid more than \$600 per month. In the interim,

something happened also to participation limits. The \$300 limits of the 1950's have become \$2,500 or \$3,000 limits of the 1970's. Under current underwriting practices of most companies, it might require earnings of \$100,000 to justify maximum coverage. Only the upper 1 per cent or so of all wage earners are in the \$100,000 bracket, so our industry may serve about 99 per cent of its potential market.

Thus, historically, in the twenty years following the depression, our industry evolved from an era of no limits to those of \$300 in the early 1950's. In another twenty years we advanced to the \$3,000 limits of the early 1970's. A product once restricted to 68 per cent of wage earners has in twenty years become available to virtually all. This trend may have placed greater responsibility on your underwriters to be very selective.

Thoughts may be forming in your mind, and I can almost hear the words "marketing considerations." I imagine most of us respect those words and live with them, if not by them. In recommending your own company's participation limits, you undoubtedly know what your competitors are doing. Are they actually issuing coverage of that amount, or only offering it? At Northwestern Mutual, for example, applications for \$1,000 or more of monthly income account for 10 per cent of all disability policies. About 2.5 per cent are for amounts of \$1,500 or more.

In your own company, what contracts are actually sold by your agents? What do they really want—short-term benefits on cancelable contracts, or noncancelable with long benefit periods? Do your policy-owners want contracts with liberal or strict policy provisions? The answers to these and similar questions must affect the claim experience of your own company, which may then be similar to or differ from industry experience. Do you try to project the morbidity which may go with higher participation limits? You may be concerned about the relationship between past morbidity experience, based on smaller limits of issue, as a basis for predicting future claims under larger limits.

The next general question I would raise in your mind is how to limit the coverage which will be issued to an individual. If amounts applied for are at or near your participation limit, so that you have large disability risks, do you think experience will be similar to that for large risks in life insurance? Next please consider a series of rapid-fire questions on what you recommend to underwriters. Should they distinguish between earned income and unearned income? Is the earned income on a gross basis, or net after business expenses but before taxes? Does your company's definition of insurable income exclude income from investments, rental property, or other activities which the insured could con-

tinue to receive if disabled? If not, perhaps you would comment on this. What recognition is given to social security benefits or group insurance in force?

How much coverage is offered when both the husband and wife are working? Does income from a working spouse affect coverage on the insured? Do your underwriters take into account large amounts of life insurance with the waiver of premium benefit? If so, does this include only the premiums to be waived or the dividends which will continue on that insurance, or do you also consider the buildup of policy cash values while the insured is disabled?

Another question may be more appropriate for your underwriters, but I wonder what recognition is given to future earnings potential. How much will you insure the future needs of medical residents and interns, or graduate professional students, or undergraduate college students? How much business disability insurance can you offer to a man who has just started a new business or just changed his type of occupation?

Finally, there may be special problems which could arise from recent trends. By law, we must provide equal coverage for females. Does this make you question the validity of past morbidity experience, with shorter benefit periods for females? There is a growing interest in disability income for business insurance purposes. Does the history of business failures make you nervous about this product? Also, is guaranteed issue appropriate for some business disability packages? There also seems to be a tendency to establish superselect risk categories and to offer preferred risk contracts. Do you feel that your own morbidity experience justifies some of these distinctions?

## INDIVIDUAL HEALTH INSURANCE—PROBLEMS AND PRODUCT TRENDS

1. High-limit major medical insurance
2. Cash-value disability income insurance; applicability to hospital and major medical forms
3. The role of commercial form; yearly renewable term versus level premium pricing of medical expense reimbursement benefits
4. Definitions of disability
5. Active life reserves for disability income and medical expense reimbursement forms

### *St. Paul Regional Meeting*

MR. E. PAUL BARNHART: One of the more significant facts about high-limit major medical in 1973 is that the revised Burleson-McIntyre bill now in Congress provides for it. Presumably, the health insurance industry supports this legislation, so it would seem that the industry will be moving strongly in this direction, but there hardly seems to be any stampede.

High limits, in themselves, do *not* add very substantially to the cost of major medical. The problems that are likely to beset a major medical program will already be there before it is extended to high limit; hence, if a company is offering individual major medical at all, there would appear to be no really decisive reason why it should not expand this to high-limit major medical.

High-limit plans do present their own peculiar problems, however. One company recently "entered" the high-limit field simply by offering some new plans under its existing policy form, with greatly increased maximums. To the company's surprise, since it thought it was being a good guy, several state insurance departments objected to the plans as being prone to exaggeration and misrepresentation, since the new high maximums were very unlikely ever to be paid out during a benefit period.

There is a simple solution to this kind of objection: make the maximum an *unlimited* maximum. No one can object to a description of a plan that simply says it will pay for eligible expenses to no maximum limit. If there is a limit, it probably can be related reasonably not to a single benefit period but rather to lifetime or to lifetime expense related to any one illness or injury.

I very much doubt that high-limit plans can remain sound in the long run without reasonable inside limit controls, coupled, perhaps, with guaranteed increase options to retard obsolescence of the limits.

Another problem is reinsurance. Many companies that are prepared to retain the full risk on a \$25,000 or even \$50,000 maximum will not want to do so on a \$250,000 maximum, although even here the risk is definitely a time-period risk rather than a precipitous one, so it is hardly the same kind of risk as a quarter-million of accidental death or life insurance.

A special class of high-limit major medical is medical catastrophe insurance, utilizing high deductibles such as \$10,000 or \$15,000. These plans present definite pricing problems. The most critical is that high-deductible claim costs are especially vulnerable to inflation of medical care cost levels and accordingly must be very conservatively priced, with a strong inflation projection assumption, and/or designed with carefully constructed inside limits, to place restraints on the effects of inflation. Inside limits, on the other hand, if used, must be realistic in relation to the high deductibles.

A second problem is the loss ratio. Catastrophe major medical resembles long-term disability or accidental death and disability coverage, in that the expected rate of claim is very low but the average claim is very large. Accordingly, it needs large contingency margins, and the expense ratio will also tend to be high. This coverage should be accorded the lower minimum loss ratios permitted on accident-only benefits, but some insurance departments expect a minimum 50 per cent loss ratio simply because it is an "accident and sickness" benefit. These "anticipated loss ratio" problems thus also have to be worked out.

I do not view any of these problems as really serious ones. I feel that if the industry is really serious in supporting passage of the National Health Care Act, then it ought to get moving on high-limit and remove any reason or excuse for some kind of federally insured medical catastrophe insurance plan.

**MR. JAMES T. COLBURN:** Perhaps the most controversial and sensitive issue before the disability industry is the definition of total disability. Lest my intentions become lost in the discussion that follows, I want to make it clear that I intend to criticize the recent trend to "liberalize" the definition of total disability by providing disability benefits for long periods, even to age 65, for the insured's inability to perform the duties of his own regular occupation.

I agree that the qualifications for benefits of a noncancelable dis-

ability policy are indeed difficult to define. Such definition requires hindsight, foresight, and imagination. The qualifications must be drawn so as to serve the intended purpose of the policy. Most people would agree that the purpose of the policy is to provide a replacement of income which is lost or considerably reduced as a result of injury or sickness. Before one can proceed with definition, consideration must be given to ways of preventing an insured from converting his policy to a pension plan or unemployment insurance. One should not spend so much time on this effort, however, that he deludes himself into thinking that he can exclude everything but legitimate claims. Such an exercise would be laborious, frustrating, and futile.

I will now discuss briefly four types of disability definition which have emerged recently and comment on whether they achieve the desired objective while providing protection against misuse. I wish I could give an empirical analysis of the claim costs of each type, but unfortunately I am afraid we are all proceeding on intuition.

1. The most common definition is that which presumes disability if the injury or sickness prevents the insured from engaging in his own regular occupation. Often the period ascribed to such presumption is limited to five years or less. Recently, however, companies have engaged in a horse race to see who can extend the period of presumption the longest; some even have presumed such disability all the way to age 65.

This "regular occupation" definition falls short of serving the intended purpose. First, this definition totally ignores the requirement that the insured suffer a loss of income. The company is merely presuming that the insured will have a loss of income if he cannot engage in his regular occupation. Conversely, if a disabled insured returns in some limited capacity to his own occupation, which over 99 per cent will do, disability income benefits cease even though the insured still may be suffering a considerable loss of income resulting from his injury or sickness. Second, this definition of disability leaves the door wide open for abuse. I understand that the companies are very selective regarding issue; however, no degree of selection, in my opinion, can prevent misuse of this policy, particularly in periods of economic turmoil.

2. The second definition which is in common use today is one which provides benefits upon the inability to perform in one's own occupation, with benefits reduced by 50 per cent of earnings derived from any new job. This definition is much less subject to abuse; however, it also fails to recognize the need to replace lost income for the insured who tries to return to his own job in some limited capacity.
3. A third definition is one which we have referred to in our company as "residual disability." This definition provides that benefits will be payable as long as two conditions are satisfied. They are (1) that there be a limited

qualifying period, such as twelve months, of an inability to perform in one's own regular occupation; and (2) that there be a loss of income subsequent to this qualifying period of at least 25 per cent of the earned income prior to the insured's becoming disabled. Full benefits are paid during the qualifying period and for as long thereafter as the insured is unable to perform any job. After the qualifying period, if the insured is working, benefits are paid proportionately to his loss of income. This definition has the advantage of at least concerning itself with the intended purpose. One disadvantage of this policy is the need for the artificial qualifying period in which an insured must be unable to perform the duties of his own occupation. The residual or proportionate benefits may not begin until this qualifying period of twelve months has been satisfied. The reason for inserting the qualifying period is to avoid misuse by the individual who would like to go into semiretirement or otherwise would like to cut down his work load at the expense of the insurance company.

4. A fourth type of policy provides proportionate benefits from the beginning if the insured has suffered a loss of income as the result of injury or sickness. No matter what anyone else says, this is the name of the game—replacement of income. My only reservation about this policy is that it is an invitation for an overworked self-employed insured to have the insurance company finance a cutback in his work load which was suggested long ago by his physician.

As I see it, each company has one of three choices to make: (1) they may enter the horse race of extending the period of regular occupation to points unknown. This would have the advantage of perhaps satisfying their field force, and any financial disadvantages may not emerge until present management has been replaced by the next generation; (2) they may gamble with the acceptance of the agency force and adopt the second definition I described, which reduces benefits by 50 per cent of income derived from a new job; or (3) they may decide to serve the public by drafting a policy which replaces income. This will require more forethought and imagination, but I anticipate that the effort will be amply rewarded. Certainly our experience is that the agency force has accepted our plan as one long overdue in the industry.

Who among us today can say that we are serving an insurable need if our only criterion for determining the qualifications for disability benefits is that the insured be unable to perform the duties of his regular occupation? Although this concept of disability is rather simple to administer, it just does not do the job which is expected of a disability income policy.

I contend that we as private insurers will continue to do the business of disability and life insurance only so long as we provide a socially de-

sired service. When it becomes evident that we are no longer providing such service to the public, then we are in danger of losing this right. My point is that, like it or not, we must be continually cognizant of the need to provide insurance to cover insurable needs.

One last thought: If you use the return of premium rider, you must be doubly concerned about the long-range effects of your definition of disability because you will have double the number of policies in force after ten years.

MR. CARL L. LOEFFEL: Companies, in looking at their definitions of total disability, should look at more than just the "your occupation" portions of the definitions. We have found in the better class of risk that at this date the presumptive portion of the disability definition is more expensive. While we never yet have terminated a claim or would have terminated a claim in this class due to a change in the definition in the "your occupation" area, we have paid several claims due to the presumptive area while the insured continued to work.

Another area is the determination of whether a claim is payable as sickness or accident. This is especially important when there is a significant difference between the maximum benefit periods. Companies which do not require that total disability for accident commence within a specified period run the risk of an insured's having an accident while the policy is in force, but at an early age, and then claiming total disability resulting from the accident just prior to normal retirement. This is especially expensive if lifetime benefits are payable.

MR. R. TERRY NELSON: My intention here is not to deliver a learned treatise on the subject of active life reserves for health benefits. My hope is to say only enough to stimulate discussion. I am going to avoid the fringes, such as possible techniques for reserving loss-of-use riders, and come to the heart of the matter, that is, the basic morbidity standard.

Most discussions of active life reserves today are split into two areas: statutory reserves and those for generally accepted accounting principles statements. I would like to confine myself to the latter in discussing medical expense business and to the former in discussing disability income.

I am perhaps a poor choice for the discussion of medical expense business, since we are in the process of de-emphasizing all types of this business, and it represents a decreasing percentage of our total health business. For the record, we use the 1956 intercompany table for our hospital business and Paul Barnhart's tables for most of our major medical. Paul

Revere adjusted its earnings for 1972 and used a technique for medical business which was a little unusual. Our experience for medical business, unlike our loss-of-income business, is in the form of loss ratios. We projected these loss ratios into the future by year of issue. We did the same for premium income. By combining these projections in the aggregate, we were able to obtain a figure representing the sum of our active life claim reserves on an adjusted basis. We found this figure to be about two and one-half times the corresponding statutory figures. Interestingly, however, we found the earnings adjustment due to these benefit reserves to be slightly positive but practically invisible.

It seems to be more or less an accepted fact that the Commissioners Disability Table (CDT) is a highly conservative valuation standard. Companies switching from the old Conference table frequently have been stunned by the size of these newer reserves. The Paul Revere has recently been able to make some observations in this area, which I think are worth sharing.

We are in the process of a detailed study of our morbidity. When we are finished, we will have examined some 225,000 claims. We started at the professional end of the occupation class scale and have not yet completed our work, but we have done enough to make some interesting observations. I calculated some "statutory" reserves (1958 CSO mortality, 3 per cent interest), using our experience on occupations, which should approximate the occupation level of the CDT. I found that over a representative range of elimination periods, benefit periods, issue ages, and durations the CDT was indeed adequate, but only slightly so. It appears that the over-all margin is under 10 per cent. There were some specific areas where the reserves appeared to be definitely inadequate. For elimination periods of fourteen days and under, the CDT reserves appeared to be 5-10 per cent too low. For most plans, reserves where the attained age was high were lower than our experience would indicate proper.

The fact that these differences appear is largely due to the slope of the CDT by age. While our net level premiums were generally lower than those in the CDT, the slope of our claim costs was significantly steeper than in the CDT, and hence our reserves were higher at many points.

#### *San Francisco Regional Meeting*

MR. JAMES W. PILGRIM: A discussion of problems and product trends with regard to high-limit major medical insurance would not be complete without a few minutes spent first discussing some of the prob-

lems and trends concerning the major medical product itself. No one would deny that we have experienced a rapid and continuous increase in the cost of medical care. The reasons for the trend are obvious—development of new drugs, new treatment facilities, more sophisticated hospital equipment such as heart-lung machines, renal dialysis units, and intensive care facilities, all of which are quite costly. Given the broad range of benefits provided in a major medical policy, coupled with the rapidly rising cost of medical care, we can expect the trend of major medical claim experience to be ever upward. As a result we have, with increasing frequency, had to institute periodic premium increases in an effort to keep this line of business solvent.

The rapid increase in the cost of medical care has not been due solely to forces outside the insurance industry. Major medical insurance itself has contributed substantially to inflation in medical care costs.

We have attempted to deal with the problems brought about by the increases in the cost of medical care by changing the design of our major medical products. We have imposed inside limits on room and board benefits, incorporated surgical schedules, included coverage for extended care facilities, and introduced variable deductibles to account for other coverages. Many of these changes have been helpful in our attempts to provide adequate major medical coverage for our customers at a reasonable cost, but they have been only partial solutions at best. We need to develop an atmosphere and state regulations that permit us to be able to respond quickly to changes in medical technology and the resulting changing needs of our customers through the use of a more flexible individual major medical product. Perhaps high-limit individual major medical insurance is a step in the right direction; then again, it could just aggravate the situation.

Companies are, with increasing frequency, offering high-limit major medical insurance on a group basis, but, to date, only a few companies offer this type of coverage on an individual basis. Reasons for the hesitancy on the part of companies to extend this coverage to policies written on an individual basis would include the following:

1. Lack of credible statistics to use as a basis for determining the benefit cost.
2. Reluctance to introduce an added benefit that could have limited sales either because of a lack of market penetration or as a result of national health care legislation.
3. Difficulty in determining appropriate underwriting controls.
4. Reluctance to spend substantial amounts of surplus developing a product that appears to provide a limited potential for an adequate return on this investment.

In spite of all these potential problems, it may be possible to overcome these negative points of view and to provide a product that both is needed and carries at least the anticipation of a profit for the company. Some possible methods are the following:

1. Make use of current claim statistics for group and individual major medical products as a base from which to extrapolate an appropriate claim cost. By structuring the claims by level of expenses incurred, it is possible to measure both the frequency of penetration of a given dollar claim level and the total dollars of expenses in excess of a given dollar claim level. From this an appropriate benefit cost for the added maximum benefits may be extrapolated. It may be necessary to relate the claims for a given observation period to a medical care cost index, so that provision can be made for an increasing frequency of penetration of the claim dollar level over time as inflation causes medical care costs and benefit payments to rise. In addition to recognizing the effect of inflation, one must account for the extremely expensive medical procedures being developed and used, such as heart-lung machines and renal dialysis units, the cost of which may not be included in current claim experience. Use of these new procedures will cause the frequency of penetration of a given dollar claim level to increase at a greater rate than is indicated by accounting solely for the effect of inflation on medical care costs.
2. Include an adequate contingency margin to cover the substantial potential fluctuations that can result with this type of benefit in view of the very small probability of occurrence.
3. In order to overcome the possibility of limited new sales, consider offering this coverage as a rider to existing in-force medical policies for an increased premium. The mailing could be made with the premium notices offering the policyholder an opportunity to increase his coverage. Not only could a new higher maximum be offered, but, at the same time, policyholders with maximums at levels below the highest maximum previously offered could be given an opportunity to upgrade their benefits to a higher-level maximum, not necessarily to the highest maximum limit.
4. If the company finds it necessary to increase premium rates on certain blocks of in-force business, this high-limit benefit could be made a part of the price and product revision, thus softening the blow of a rate increase by making an over-all improvement in benefits. Addition of this new maximum limit will probably result in greater acceptance of the rate increase.

Twenty-five years ago, when individual major medical insurance was first introduced, we had the idea that we were providing insurance for the infrequent illness or injury which resulted in substantially large medical bills. Today, more and more hospital confinements for minor impairments result in major medical claims. When we introduce high-limit major medical insurance for the large medical bills today, we will

need to keep our product current and flexible enough to be sure that the product that is priced and designed to cover the "tip of the iceberg" today is not used tomorrow as if it were adequate to cover the whole iceberg.

**MR. NIELS H. FISCHER:** The \$250,000 major medical maximum was introduced by Aetna on a company-wide basis, applying to group, franchise, and individual contracts. The new maximum benefit is automatic for smaller-group cases and for franchise cases. It is optional for large-group cases and individual and family major medical expense policies.

I concur readily with Mr. Pilgrim's observation that the claim cost experience on smaller maximum benefits is not yet available for use in predicating the cost of the higher maximum. For a \$50,000 maximum benefit, for example, it takes many years to obtain mature claim experience for the few chronic but expensive types of illness which can generate such high amounts of medical expenses.

Actually, we believe that we have more underwriting control for the \$250,000 major medical expense maximum benefit on our individual and franchise policies than may be the case on smaller group insurance policies. For group insurance, there is the distinct possibility of antiselection where medical underwriting is not carried out. For individual and franchise business, however, the medical questionnaire will reveal physical conditions which could lead to high medical expenses.

**MR. ANTHONY J. HOUGHTON:** The problem that worries me about a high stated limit such as \$100,000 or \$250,000 is the possibility that the providers will perform experimental treatment at an enormous cost because of the existence of such coverage. Then, if the carrier resisted paying because the treatment was not considered "usual, customary, or reasonable," the provider or policyholder could argue that the very statement of a limit such as \$250,000 was misleading if the company would not honor charges for unusual treatment, since standard treatment very seldom, if ever, would result in such a large charge.

An unlimited benefit might be more prudent if the sales material did not implicitly or explicitly refer to enormous claims but referred only to paying the agreed-upon percentage of usual, customary, and reasonable costs.

**MR. WILLIS W. BURGESS:** At its June, 1971, meeting the National Association of Insurance Commissioners adopted its guidelines on non-

forfeiture values in health insurance policies. Two of the underlying issues which led to the development of the guidelines were (1) consideration as to whether nonforfeiture benefits might be appropriate in policies which contain a deferred benefit and (2) consideration as to whether certain deferred benefits should be included in health insurance policies. Any discussion of cash-value health insurance focuses on such deferred benefits, and my remarks will be limited to them.

On the basis of the guidelines and the popular types of such benefits provided to date with disability income insurance, it is anticipated that any benefits to be offered with hospital and major medical forms would be predominantly as follows:

- A. *Type of deferred benefit, as defined by the guidelines:* Type 2—deferred benefit in the form of a single payment; type 3—deferred periodic benefit.
- B. *Return of premium:* These deferred benefits would take the form of return of premium benefits.
- C. *Claim payments offset:* The deferred benefit and any withdrawal benefit associated with it would be reduced because of claim payments under the policy.
- D. *Renewability of policy:* Noncancelable or guaranteed renewable.
- E. *Withdrawal benefit:* Type 2 benefits (single payment) would contain a withdrawal benefit. For states requiring a withdrawal benefit, the minimum withdrawal benefit, before allowing for reduction because of claim payments offset, is the five-year preliminary term reserve for the deferred benefit, before allowing for claim offset reduction, at 5 per cent and using a mortality table acceptable for reserve purposes. The claim offset reduction then allows for the deduction of (1) the actual past claims and (2) the expected future claims. Type 3 benefits (periodic benefit) would contain characteristics which do not require a withdrawal benefit under the guidelines, and it is assumed that they would not include a withdrawal benefit.
- F. *Characteristics of type 3 benefits (periodic benefit) which do not require a withdrawal benefit:*
  - 1. Interval between successive payments of the benefit is not greater than ten years.
  - 2. Death of the policyholder or termination of the policy on account of age or duration establishes the end of an interval for the purpose of determining entitlement to the benefit.
  - 3. Insured may discontinue the benefit on any anniversary, with a corresponding reduction in premium.
  - 4. Whenever the amount of claims accrued during any interval exceeds a stated proportion of the total policy premiums for the interval, no benefit will be payable for that interval (cutoff provision), but a new interval will start on the next anniversary date (rollover provision).

There is very little activity currently in providing these deferred benefits with hospital or major medical coverage.

Any company which is considering moving into the return of premium area with hospital and major medical coverage should take into consideration the following:

A. DEVELOPMENT OF THE NECESSARY ACTUARIAL ASSUMPTIONS FOR  
ADEQUATE RATES AND RESERVES

This is very difficult. We really do not know how morbidity and persistency will be affected. There has been little experience with these deferred benefits. A considerable amount of groping will therefore take place in developing actuarial assumptions, and wide variations in actuarial judgment are possible.

The type 3 benefit (periodic payments) requires the determination of the probabilities of the benefit being paid at the ends of the rolling cycles and an estimated value of such benefits. This is exceedingly complex. For each combination of benefits, it should take into consideration claim frequency and distribution of claims by amount, by age and sex, and an intricate interplay of probabilities and values involving these variables, since it must deal with claims small enough in the aggregate not to disqualify the policy for the return of premium benefit.

The type 2 benefit (single payment) also requires the determination of the probability of the benefit's being paid and an estimated value of the benefit. This is not nearly as complex as for type 3. However, in estimating the value of the reduction for claims paid, claim costs which do not exhaust the benefit should be estimated rather than mean levels of claims.

A reasonably conservative approach must be taken to reserve these benefits to minimize the possibility of inadequate reserves, and must be tested on a gross premium valuation basis. The actuarial technique for computation of type 3 reserves is complex and has not yet been fully explored.

B. STATE INSURANCE DEPARTMENTS' POSITIONS

There has been no significant change in the attitudes of individual states toward these benefits since the guidelines were adopted. Some states will not approve them; others will, without reference to the guidelines; and still others will, subject to the guidelines. Some states which have indicated that type 3 benefits (periodic payments) are not acceptable are Oregon, Michigan, Texas, New Jersey, Maryland, and New York. Some which have indicated that type 2 benefits (single payment) are not acceptable are New York, Texas, and Maryland.

Such benefits, if applied to hospital or major medical coverage, might be subject to criticism by consumerists and/or insurance departments because of wide concern over the need to improve significantly the availability of proper health care at reasonable costs. The point might be raised that the extra money spent for the return of premium benefit would be better used to provide additional health care benefits.

## C. MAJOR MEDICAL OR COMPREHENSIVE COVERAGE

Since rates on such coverage must be increased periodically because of inflationary trends, building in a deferred benefit feature tied to the return of premiums with claim offset would further complicate the determination of rates and the administration of such a benefit.

However, a deferred single payment benefit with claim offset could serve as a potential hedge against the high cost of such insurance. Premiums might be set high enough to price estimated inflationary trends, which cannot be done for conventional policies because of competitive considerations. This could provide to an individual with good claim experience such a potential hedge, in the form of withdrawal benefits and the single-payment deferred benefit, against the high premiums for such inflationary benefits.

## D. HOSPITAL INDEMNITY

Including deferred benefits in hospital indemnity policies might compound the criticism of deferred benefits. Hospital indemnity policies are being criticized currently because of misleading or misunderstood offerings by mail order insurers.

However, providing such benefits in the form of withdrawal benefits can be viewed as more equitable treatment of withdrawing policyholders.

The actuarial aspects of including deferred benefits in hospital indemnity policies are very similar to those for such benefits contained in disability income policies and lend themselves to the use of the same approaches for these benefits as are being used for disability income.

## E. NATIONAL HEALTH INSURANCE

Because of the probability that some form of national health insurance will be enacted in the next few years, before any significant investment in time and money is made in the development of such benefits, careful consideration should be given to whether sufficient acquisition costs will have been recovered prior to the effective date of such legislation to make such development worthwhile.

## F. GENERAL

Careful consideration should be given to the negative aspects involved in developing, selling, and administering these benefits before any significant investment in time and money is made in the development of such benefits.

MR. FISCHER: I believe that cash-value health insurance contracts should be reserved for those forms of coverage which represent permanent needs. The cash-value provision is intended to improve persistency. In the light of the imminence of a national health insurance plan, I question whether any company should continue to use even the guaranteed renewable approach to any new hospital and medical policies introduced in the future.

MR. JOHN S. THOMPSON, JR.: North American has been issuing a return of premium benefit of type 3 for about four years. Our premium return benefit would probably not receive approval if filed currently, in view of the regulations that have gone into effect since the original introduction of it. We are now developing a type 2 benefit, since we feel that it may be desirable to avoid the full forfeiture that arises from the absence of cash values. In connection with our studies of this new benefit, we have concluded that the premium return benefit involves a high degree of risk when considered by itself. This is not necessarily the case when the disability and return benefits are considered together, at least with respect to those policies under which aggregate disability benefits are less than the cash benefit payable under the return benefit, since the addition of the return of premium benefit to a policy merely affects the incidence of benefits and not the aggregate amount of benefits. This is not the case where the elimination period is of long duration (for example, more than thirty days); in that case, the value of the return benefit tends to be very large in relation to the value of the disability benefit. As a result of this consideration and others, we do not offer the return benefit with policies subject to an elimination period of more than thirty days.

MR. BURGESS: Commercial policies, where an insurer has the right to decline to renew any individual policy on any renewal date, are not being written in any great volume. It is not a popular belief that individual risks should be penalized for using their benefits by taking away their insurance against medical expenses when they need it. A fundamental principle of health insurance is that the sick are subsidized by the well, and the sick should not be terminated when they utilize their benefits.

However, there may be exceptions under which a company might want to experiment with coverage on which there are no significant data on which to base rates. In such instances, the use of optionally renewable policies may be a proper solution to making such types of coverage available under reasonable risk-taking conditions to the company.

Also, optionally renewable policies can be provided at a premium significantly lower than for noncancelable or guaranteed renewable policies, thus providing coverage to individuals who perhaps could not afford such coverage at a higher cost.

Because of skyrocketing medical costs, there is considerable interest within the health insurance industry and among state insurance department officials as to the relative merits of level premium pricing of such

benefits as compared with step rates, perhaps even on a yearly renewable term (YRT) basis. Some of the arguments which can be raised are the following:

A. For level premium pricing

1. When a premium increases, the policyholder compares his new and old premiums before paying the premium. This brings into consideration an additional factor against his renewing the coverage and introduces additional antiselection and a potentially higher lapse rate at that time. With YRT pricing, this problem would be present each year.
2. Step-rated policies become very expensive at the higher attained ages in relation to the corresponding level premium for the age at issue.
3. The combination of step-rate premiums and inflationary benefits has a combined adverse effect on lapse rates.
4. If policy benefits are subject to inflation, the building up of some active life reserves under level premium pricing dampens somewhat the severity of later rate increases.

B. For YRT pricing

1. YRT pricing would keep the rate for younger people attractive to them.
2. Level premium pricing has disadvantages in application to inflationary trends in medical expenses. Projecting the cost of such expenses into the future without estimating such trends is unrealistic, yet to take such trends into consideration would produce unattractive level premium rates.
3. YRT pricing eliminates the criticism of no forfeiture on lapse or termination, since reserves should not be required nor maintained on a YRT-priced basis.
4. If standardized forms are ever required for comprehensive coverage, the competitive aspects of the premiums will be very important and YRT pricing should be prevalent.
5. If YRT pricing were employed, it would provide benefits yearly based on current costs, and benefits could be made flexible so that they could be updated each year if desired.
6. For insurance benefits specifically geared to supplement Medicare Part A benefits, each year as the Medicare deductible increases, the benefits could increase accordingly. YRT rates would be reviewed each year to determine whether an increase was necessary and, if so, the extent of the increase.
7. With a level premium approach, it is necessary to spread maternity costs over a larger segment of the insured population than females of child bearing age at issue. Otherwise, rates would decrease with age, and a woman could buy new coverage, at her attained age, at a lower rate. Step-rated coverage would reduce this problem, since her rates would decrease with attained age. Even under YRT pricing, however, unless

rates are spread over more than just the females of childbearing age, the rates would not be attractive to younger women, and maternity anti-selection could be significant.

MR. PILGRIM: The frequency with which companies have been liberalizing their definitions of disability in their disability income policies is increasing at a fantastic rate. It was less than ten years ago that one of the leading disability income insurers in the country was considered bold for providing a five-year "own occupation" definition of disability for policies issued to individuals in their professional class. Today that company defines the "own occupation" period as the longer of "to age 65" or five years. At the present time there are at least three companies that I know of providing "own occupation" definitions of disability to age 65 for sickness and lifetime for accident.

It has been interesting to watch the game of leapfrog being played with policy provisions over the past three or four years. Company A changes its definition from two years "own occupation" to five years "own occupation." Company B, which was at five years, moves to six years. Company C jumps from two years to seven years "own occupation" period for the best occupational class. Company A then changes from five years to one hundred months. Company B moves to ten years. Company C, which just moved to seven years, jumps to ten years. Company D then enters the picture and jumps from a five-year "own occupation" definition to the longer of "to age 65" or five years, reasoning that it has protected itself adequately at the older ages and possibly has had the last word in liberalizations of the "own occupation" definition. Not so. Company C jumps to a "to age 65 own occupation" definition, and finally a new company enters the picture and provides a lifetime "own occupation" definition of disability for lifetime accident benefits and a "to age 65 own occupation" definition of disability for sickness benefits.

All this takes place over a span of about four years and in most cases does not involve any increase in premium rates for these added benefits, but only a finer breakdown of the best occupational class into those in superselect occupations and those in select occupations. I predict that we have not yet heard the end of this game of leapfrog. Someone will probably come out with a lifetime plus ten years "own occupation" period in order to provide some benefits for the widow.

An interesting sidelight is that while all this liberalization is going on in individual disability insurance policies, our friends in the group insurance business are reducing the "own occupation" period from two years to one year as a result of adverse claim experience during the re-

cent recessionary period. We should keep in mind, however, that group long-term disability coverages involve insuring a larger proportion of the more hazardous occupations than do individual disability coverages. In addition, the adverse claim experience for group long-term disability coverages may also be due in part to individual case antiselection.

Just what is the cost of these more liberal definitions of disability? Some argue that, for the occupational classes to which these more liberal definitions of disability are provided, an individual unable to perform in his own occupation will also be unable to perform in any occupation for which he is reasonably suited by education, training, and experience, so there is no additional cost.

An interesting exercise that produces some startling results is to go back to the basic tables for the 1952 disability study and make some assumptions concerning a reduction in recovery rates in the disabled life tables, and then measure the additional cost of providing disability benefits. For example, if you assume that recovery rates will be cut in half as a result of the presence of an "own occupation" definition, then an increase of from \$4 to \$7 per \$100 of monthly income is called for in the gross premium in order to provide the extra benefits.

Some would argue that this is an exercise in futility because the 1952 disability study is not representative of current experience and it was based on claim experience under benefits with an "any occupation" definition of disability. On the other hand, the 1952 disability study is the best statistical source of data available for experience on long-term claims.

The problem with long-term "own occupation" definitions is that they do not define adequately the loss we intend to insure. We intend to cover an economic loss caused by a disabling accident or sickness, but we define the loss as inability to perform in one's own occupation and presume that there is some sort of economic loss but never really require that there be one in order that the insured qualify for benefit payments. The solution is to require that there be an actual loss of income and then provide benefits to cover all or a major portion of that loss. In the marketplace today, a single company cannot accomplish this change while others continue to provide benefits that are not related to losses.

We could shift the direction in which we are moving by taking some of the following positive actions:

1. As part of our intercompany experience studies, we could attempt to segregate and analyze the experience by the various definitions of disability. We could also collect experience for years beyond the second year of disablement.

2. We could develop a sound overinsurance provision that would be a required statutory provision. This was tried about ten years ago and was scuttled by the industry, but it should be reconsidered in light of changes that have taken place since then. If we could demonstrate that inclusion of such a provision resulted in better benefits covering actual losses at lower premium rates, the buying public would be much better off than it is currently.
3. We could develop comprehensive and effective replacement restrictions to reduce the replacement of quality coverage.
4. We could design our disability income policies so that we would be insuring actual losses, not guaranteeing successes.

MR. E. PAUL BARNHART: It has now become commonplace to see policies with definitions of total disability based on very long-term periods of inability of the insured to engage in his regular occupation, at least for the best one or two occupational classifications. I, for one, continue to have a great deal of difficulty in appreciating the justification for this, if there is any, since the eventual result has to be paying out thousands of long-term claim dollars on a policyholder who is earning a perfectly adequate income.

I just cannot see "competition" as an adequate justification for such an economically absurd provision. It is a distinct relief therefore, to me, to see an increasing number of companies reintroducing sanity into the disability income field by tying the income benefit, in some reasonable way, to the claimant's earned income, following some initial total disability period of, say, six to twenty-four months. This encouraging trend is, I hope, changing the direction of disability income back toward its original and proper objective of income protection.

"Earnings integration" provisions, as I call them, do present claim administrative complications, since practical methods obviously have to be devised to verify actual income at reasonable intervals. Defining "earned income" is itself no simple matter, either. In spite of these obstacles, I believe that earnings integration is the only economically sensible, and economically defensible, direction to take.

It would be extremely valuable if some of the participants in this session could make some report on their experience under any of these newer disability provisions—either earnings integration or long-term regular occupation definitions, or both.

MR. BURGESS: Because of the many types of medical expense benefits and corresponding benefit details, the determination of active life reserves is to a great extent tailor-made and requires the application of data which are not in published tabular form.

Examples of some of these benefits and the way in which my company determines active life reserves on them are given below.

#### A. INTENSIVE CARE

A survey of hospital charges by the American Hospital Association was used to estimate the percentage of days of intensive care benefits provided in relation to all hospital room and board days provided, and projections were made on the basis of this trend and the rate at which intensive care room and board facilities are increasing as compared with growth rate on hospital room and board facilities.

A Department of Health, Education, and Welfare Vital Statistics Report was used to estimate the utilization of intensive care facilities by age, relative to total hospital days.

The 1956 intercompany daily hospital room and board claim costs were adjusted by relationships developed from these sources, to develop reserves for per diem intensive care benefits.

#### B. MEDICARE SUPPLEMENTARY COVERAGE

##### 1. *Part A: Hospital Benefits*

Our coverage essentially pays all hospital expenses in semiprivate accommodations, supplementing Medicare, up to a maximum of \$25,000. For reserve purposes, we consider that we are paying the initial Medicare deductible for all hospital confinements, per diem benefits at the rate of one-fourth the Medicare deductible for the 61st through 90th days of confinement, per diem benefits at the rate of one-half the Medicare deductible from the 91st through 150th days of confinement, and all necessary expenses for further days of confinement.

We assume that the current level of deductible will be in effect for the life of the contract, and value as of the current date, based on the effective date of coverage and age on such date. Each year, as the deductible changes, we substitute the new deductible in the reserve formula.

For reserving the initial deductible, we use a frequency of hospitalization based on our own experience.

For benefits other than the initial deductible, we use the 1956 intercompany tables, for per diem hospital benefits adjusted for the confinement periods involved by using an extrapolation of the Houghton continuance table.

For the benefits payable after the 150th day, which are not dependent upon the Medicare deductible, we assume that the benefits are equivalent to the average per diem hospital charges for Medicare patients, as given in Medicare statistics published by HEW. Based on these average per diem charges, we determine the number of days required to meet the policy maximum and apply the continuance table based on this period.

##### 2. *Part A: Extended Care Facility Benefits*

Our coverage essentially pays all extended care facility expenses in semiprivate accommodations, supplementing Medicare, for the first 100 days of

confinement in an extended care facility entitled to receive payments under Medicare. For the 101st through 200th days of confinement, in such a facility, we pay such expenses at the rate of \$15 per day.

For reserve purposes, we consider that we are paying at the rate of the extended care facility Medicare deductible for the 21st through 100th days of such confinement and at the rate of \$15 per day for the 101st through 200th days. We assume that the current level of deductible will be in effect for the life of the contract, and value as of the current date, based on the effective date of coverage and age on such date. Each year, as the deductible changes, we substitute the new deductible into the reserve formula.

Figures for frequency of admission to extended care facilities and frequency of hospitalization among Medicare patients were obtained from Medicare bulletins published by HEW. The ratio of frequency of admission to extended care facilities to frequency of hospitalization were then applied to the frequency of hospitalization from the 1956 intercompany tables to estimate the frequency of admission to extended care facilities, for reserve purposes.

The average claim was estimated by applying a continuance table derived from a United Auto Workers Blue Cross extended care facility supplement plan to our policy benefits. This average claim was divided by the average confinement for hospitalization for Medicare patients, taken from the Medicare bulletins published by HEW, to estimate the average claim per day of hospital confinement. This factor was then applied to the 1956 intercompany tables of average claim per \$1 of daily hospital benefit to estimate the average claim, for reserve purposes.

Some of the problems we have encountered with the Internal Revenue Service on active life reserves on health insurance policies are the following:

- A. The Life Insurance Company Income Tax Act allows mean reserves in the calculation of required interest. We use midterminal reserves and add an adjustment to approximate mean reserves. The IRS has taken exception to this.
- B. The IRS has thrown out all experience tables not based on published tables, in determining interest required to maintain reserves. We are contesting this.
- C. In section 809(d)(5) of the act a deduction is allowed from the gain from operations: "An amount equal to 10 per cent of the increase . . . in the reserves for nonparticipating contracts or (if greater) an amount equal to 3 per cent of the premiums . . . attributable to nonparticipating contracts . . . which are issued or renewed for a period of 5 years or more." Two issues are involved:
  1. Are guaranteed renewable policies "issued or renewed for a period of 5 years or more"? The court of appeals held in a case that they are not.

2. Are nonparticipating guaranteed renewable policies thus not included in either alternative under this deduction? The IRS has ruled that the "Life Insurance reserves" on such policies can be included in the 10 per cent increase in reserves.

Another deduction is allowed in section 809(d)(6): "an amount equal to 2 per cent of the premium . . . attributable to accident and health contracts (other than those to which paragraph (5) applies). . . . The deduction under this paragraph for the taxable year and all preceding taxable years shall not exceed an amount equal to 50 per cent of the premiums . . . attributable to such contracts."

The effect of the court of appeals decision and the IRS ruling on paragraph (5) is to require a deduction of 10 per cent of the increase in the "Life Insurance reserves" on nonparticipating guaranteed renewable policies rather than 2 or 3 per cent of the premiums for such policies.

However, there is a bill before Congress stating that Congress' intention is to consider that guaranteed renewable policies are renewable for five years or more. Further, the United States Court of Claims held in a decision handed down in March that such policies are issued or renewed for a period of five years or more.

MR. HOUGHTON: The actuary must be careful that active life reserves take into account liberal provisions that increase the cost beyond that contemplated by the 1964 CDT, such as long minimum benefits for disability extending beyond age 65, deemed total disability for specific impairments and "his own" occupational clauses.

## VARIABLE LIFE INSURANCE

1. Asset share calculations: emergence and sources of profit and/or margins
2. Current developments
  - a) Report on SEC decision of January 31, 1973
  - b) Marketing impact
  - c) Drafting of prospectus
  - d) Tax status of company and of policyholder
  - e) Company decisions
    - (1) Product design
    - (2) Timing of recognition of investment results
    - (3) Reserve for minimum death benefit guarantee
    - (4) Reserve maintenance (e.g., Commissioners Reserve Valuation Method) on a basis different from the benefit formula (e.g., net level premium)
    - (5) Accounting problems—timing of transfer of funds
    - (6) Issue and backdating
    - (7) Underwriting, substandard and reinsurance
    - (8) Qualified plans, P.S. 58 costs

### *St. Paul Regional Meeting*

MR. BRUCE E. NICKERSON: Clearly, both the amounts and the incidents of profit will be very different under a variable life insurance (VLI) policy than under a fixed benefit policy. This will be true whether we consider traditional statutory profit or profit under generally accepted accounting principles.

Although the VLI policy transfers the direct investment risk to the policyholder, the profitability of this product to the insurance company may prove to be even more sensitive to investment performance than is the profitability of a conventional policy. Let us consider the elements of profit which could produce such a result.

Although the level of expenses will undoubtedly be somewhat higher for VLI, the nature of the expense risk is probably not much different. The excess of the gross premium over the net premium will be retained in the general account, and general expenses (other than investment expenses) will be borne by the general account. Without considering the adequacy of other sources of profit, such as mortality and interest, to offset expenses, it seems likely that drains on profit from expense in excess of premium loading would be similar to such drains on fixed benefit policies.

The interest contribution to profit will be very different, however. In a fixed benefit policy, the entire excess of investment income over the interest required to maintain reserves and to cover the interest element in the dividends flows directly to profit, while capital gains flow directly to surplus. A deficiency in investment income, or a capital loss, has a similar immediate effect. In a VLI policy, the analogy to interest income is the asset charge. Whether the investment performance is good or poor, the company retains a fixed percentage of the assets. Since the investment performance directly affects the amount of assets against which this charge is assessed, the profit potential in the asset charge is directly dependent on the investment performance. For any policy, the value at issue of the profit potential is the present value of an annuity, for the "life" of the policy, of the asset charges. With good persistency this can still be a significant profit element. But the time delay until this profit can be fully realized greatly increases the investment risk the company is assuming.

In contrast to the situation under a fixed benefit policy, the VLI mortality profit also depends on the investment performance—perhaps to an even greater extent than the "interest" profit from the asset charge. While the mortality profit per \$1,000 of amount at risk may be the same as under a fixed policy, in many variable designs the amount at risk is even more sensitive to investment performance than the asset buildup. In dollars, these mortality profits may well exceed the profits from the asset charge, but again full realization of these profits is spread over many years and is subject to a major investment risk.

Over the short run, VLI profits also appear to be subject to a much greater investment risk. For a fixed benefit policy, establishing reserves in excess of the asset share can be considered equivalent to earmarking surplus: the timing of book profits is affected, but the long-term worth of the insurance company is not changed. On a VLI policy, however, the excess of reserves over the asset share requires a transfer of funds from the general account to the separate account. Depending on the company's attitude toward equity investments, this may well be considered a desirable investment. My point, however, is that such a transfer of surplus from the general account to the separate account is likely to increase the investment risk assumed by the company.

The short-term mortality profit is similarly subject to substantial investment risk. It is obvious that a decline in the value of the separate account could bring the minimum death benefit guarantee into effect, thereby reducing the mortality profit and possibly producing a loss. Less obvious is the effect on gains from select mortality which many com-

panies count on in pricing fixed benefit policies. Even if the long-term investment performance were satisfactory, there could be substantial fluctuations. A bull market in the early policy years, followed by a bear market, would produce much greater mortality profits than a bear market followed by a bull market.

It seems likely that VLI lapse rates will be more sensitive to investment performance than the lapse rates for fixed benefit policies. Since any policy requires a number of years before the asset share exceeds the cash value, this risk of failing to recover the initial investment would also show an increased dependence on investment performance.

Although these appear to be the major ways in which investment performance may affect the amounts and incidence of profit, it should be noted that interaction between the general and separate accounts will permeate the VLI policy with investment risk by the company. For example, the normal delay in reporting death claims will have the unavoidable effect of transferring the investment risk to the company from the date of death until the reserve is withdrawn from the separate account.

In summary, although the VLI policy will transfer the direct investment risk to the policyholder, the insurance company should not assume that its investment risk has been reduced accordingly. The indirect investment risk to the company has been greatly increased. Even the mortality profit, traditionally largely independent, will be highly dependent on investment performance. We all know that the "expected" incidence of profit for a VLI policy will not be the same as for a fixed benefit policy. We must also consider that both the amounts and incidence of VLI profit are less predictable. Variable life may offer greater profit opportunities to the insurance company, offset by greater risks of loss, depending on the investment performance actually realized.

**MR. JOSEPH R. PICKERING:** There seem to be three reasons for profit in any profit-making organization. These are compensation for services, compensation for employment of capital, and compensation for risk.

I can think of little difference between fixed and VLI contracts in service performed or capital employed. It is only in the third area—undertaking risk—that differences arise. The amounts and incidence of risk profits vary greatly between the two types.

The intention in VLI contracts is to transfer investment risk to the customer. However, any life insurance contract can be understood only when considered as an integrated whole. The investment return cannot

be separated from the mortality rates or lapse rates or any other part of the contract. The whole nature of the actuary's job is to average all these rates together along with income or outgo to determine a price for the contract. In this sense VLI contracts are no different from fixed benefit contracts. It might be worth pointing out here that, once the investment performance of the associated separate account is known, the death benefit or surrender benefit is guaranteed. What we are doing is to guarantee a formula for determining the benefits rather than guaranteeing the benefits themselves. All this means that the profitability of VLI contracts is sensitive (quite sensitive) to investment performance.

Let us look briefly at how the investment performance affects profits. First, consider the asset charge deduction that is made before crediting performance of the separate account to the contracts. The dollar amount of this deduction will increase as the assets in the separate account increase. The investment expenses of the separate account also will grow, of course, but the asset deduction will contain margins for the mortality and expense guarantees and probably profit. There is no logical reason why a company could not, if it so chose, adopt a company philosophy of low premiums and a larger asset charge. It is the total charges that determine profits, not any one element. Next, consider any mortality profits. The company is entitled to profit for the mortality risks it assumes. But "excess" investment performance over the stated assumed investment return is used to increase the death benefit. That is, the net amount at risk increases. Therefore, profits should increase. Again, investment performance has affected the profit to which a company is entitled.

I could go on and discuss surrender benefits, the minimum death benefit guarantee, or other parts of the contract, but perhaps the point has been made. The VLI contract is not separable into elements any more than fixed-dollar contracts are separable. The company will have to decide how it wants profits to emerge. In general, a larger premium and a lower asset charge will tend to accelerate profits, but, of course, larger premiums are harder to sell.

It is my belief that profits from VLI contracts should be comparable to those from fixed-dollar contracts. The incidence will differ substantially, and therefore profits will have to be dealt with by allowing for the amount and timing differences, that is, on a discounted present-value basis. Since the predominant benefit in VLI is the death benefit (and not investment benefits as in endowment contracts), the actuary of a company might consider that the present value of all future profits, at issue, might be a function of the annual premium payable on the contract.

If profits for fixed-dollar whole life contracts have been expressed similarly, then the profits ought to be approximately equivalent.

MR. HARRY D. GARBER: It bothers me when some companies keep saying that there is no investment risk to the insurer in VLI. This is particularly important in developing an approach to federal income taxes, both for the individual and for the company. I think that the company does have an investment risk, and, regardless of what premium rate is charged, there is some rate of interest which, if not earned, will cause the company to lose money. I think we should be more careful in describing the risks.

CHAIRMAN IAN M. CHARLTON: We shall now discuss the SEC decision of January 31, 1973, concerning VLI.

MR. NICKERSON: Although the SEC will require development of a prospectus under the 1933 act and registration of agents under the 1934 act, they did grant a form of exemption under the 1940 acts, leaving to the states a mandate to develop a regulatory framework which would provide to the consumer protection similar to that provided in the 1940 acts. In particular they dealt with five subjects. These include the development of uniform asset valuation standards; the assurance that policyholders will be provided with annual statements similar to those provided by registered investment companies; protection against unauthorized changes in investment policy (you can't swing one year and go conservative the next without clearance); and restrictions on transactions with affiliates and other interested parties. The fifth point of concern is the one which will involve the greatest concern on the part of actuaries. This is that state regulation must prohibit the use of excessive management, administrative, and sales charges.

MR. PICKERING: Recently there has been a tremendous effort on the part of both actuaries and lawyers to respond to the SEC and the NAIC in developing guidelines for regulation. I see at least five ways in which actuaries might approach the states with respect to the problem of protection against excessive management, administrative, and sales charges.

The first of these is to do nothing. This, I hope, will not happen, since the states need actuarial support and the insurance industry needs fair and intelligent regulation. Second, we could recommend that the regulatory bodies rely solely on disclosure of charges and the results of com-

petition to keep charges at a reasonable level. I do not believe that this indirect approach will be acceptable to either the NAIC or the SEC. A third suggestion is that some form of nationwide regulation similar to section 213 of the New York Insurance Law would be appropriate. I believe that this misses the point completely. The 1940 acts do not regulate expenses. Rather, they regulate charges. Regulation of insurance company expenses of the section 213 type would, therefore, not really satisfy the objective of the 1940 acts. A fourth suggestion has been to develop a VLI counterpart to the Standard Nonforfeiture and Valuation Laws found in fixed-dollar life insurance. This would regulate cash values and reserves but would not regulate premium directly.

The fifth alternative I would like to touch on at this time would be the complete and direct regulation of charges. This could include premiums, asset charges, or both. The mere mention of this suggestion has been enough to generate some very exciting and stimulating discussions. The concept of total rate regulation is antithetical to fixed-dollar insurance. Many people are afraid of the consequences if state regulators are granted the power to control charges directly. Personally, I see this coming as a logical outgrowth of the development of VLI. I feel that it should come but that it should come with a maximum amount of intelligent actuarial input.

MR. NICKERSON: I would like to enlarge briefly on the approach some have suggested for developing some form of nonforfeiture law applicable to VLI. It is important to note that the minimum cash values and nonforfeiture benefits required for fixed-dollar insurance are independent of the gross premium charged. Many people believe that any corresponding laws for VLI may of necessity have to be connected in some way to premiums charged.

CHAIRMAN CHARLTON: One question to which nobody has answers but on which everybody has an opinion is the marketing impact of VLI. What will it do to the fixed-dollar insurance market? How will the industry accomplish selling with a prospectus?

MR. PICKERING: There seem to be two aspects of the marketing impact. The first is the impact on the salesman—the agent—and the second is the impact on customers. As far as the salesman is concerned, there are at least three ways in which VLI contracts differ from fixed-dollar contracts. These are licensing, product knowledge, and selling with a

prospectus. In addition to being registered to sell securities under the 1934 Securities Exchange Act, the agent will probably have to have a special state license to sell VLI. Completely apart from the regulatory requirements, there will have to be additional product knowledge, and VLI is somewhat more difficult to understand than fixed-dollar life insurance. The third thing that a salesman will have to learn with VLI is to make the sale with a prospectus. This may cause difficulty with some salesmen, since it will be necessary to deliver a prospectus at or before the first contact with the customer. Certain negative aspects of the prospectus probably will have to be pointed out specifically. In my opinion, once the salesman learns how to handle these negative aspects, his sales will be considerably more persistent than sales made without a prospectus. Customers should have a better understanding of what they are purchasing and consequently should keep it in force longer.

The second aspect of this question of marketing impact deals with the customer—who is going to buy the contract? I have heard that VLI is expected to have a significant impact on total life insurance sales. At one time it was reported that knowledgeable people were predicting that half their sales would be on the variable basis. More recently, this prognostication has been changed to a range of some 20–40 per cent.

The type of customer who will be interested in purchasing a VLI contract is, in my opinion, the same type of person who has in the past purchased whole life insurance. That is, the sales will be made where, in the absence of a VLI contract, a fixed-dollar contract would have been sold. Obviously, we in the business would expect more sales, and larger sales would be made.

The statement just made implies my belief that sales of VLI will be made primarily in the 25–40 age bracket. Some sales will be made at other ages, of course, but I believe that the majority of sales will be to the younger man just developing his life insurance program.

There is a special problem with the very young market—the juvenile market. I expect that most companies will have a minimum size for VLI of either five or ten thousand dollars. This could reduce sales to the very young ages.

In recent years a disenchantment with the stock market seems to have developed on the part of the general public. Perhaps this is only temporary, but a company should consider this before embarking on the as yet uncharted sea of VLI. I am personally excited about the prospects for marketing VLI, but it remains to be seen how the salesman will react to a different product and whether the general public will like it.

MR. EDWARD SCHER: I believe that the initial appeal of VLI will be to those persons who want to participate in some way in the stock market and to those people who are searching for some kind of hedge against the effects of inflation. I further believe that a much greater effort will be required than we have known in fixed-dollar insurance in the development of marketing and educational systems for VLI. Since fixed-dollar insurance is not a particularly simple or well-understood concept to begin with, it may be anticipated that VLI will be that much more difficult to understand. I do not think that a prospectus requirement will particularly raise an obstacle, except perhaps in its preparation and delivery.

As with fixed-dollar life insurance, VLI will be sold, not bought. The effect of additional information disclosed in a prospectus probably will vary considerably between products which are actively sought and products which must be aggressively sold. The prospectus should have less effect on VLI than it has in other security products. It has been indicated that cost comparison indexes developed for fixed life insurance have not greatly affected sales. It will take a very sophisticated person to appreciate the subtleties of VLI from a prospectus.

We anticipate some displacement of fixed life sales, but in general we expect larger total sales. We feel that the emphasis will still be on the insurance element of the product, but we recognize that the investment element appeal will be strong.

CHAIRMAN CHARLTON: We have had some experience already in marketing VLI in the context of a qualified plan. We have found that the availability of VLI has not substantially affected our fixed life qualified plan sales. There is some question whether current stock market conditions and increased hesitancy about equity investments on the part of the buyer may affect this relationship, but we feel that we have been receiving substantial attention in our VLI proposals using an abbreviated sales piece.

There has also been some question about the appropriate initial target market for VLI. Some people have suggested that the appropriate market is the sophisticated large-amount buyer—say, of amounts greater than \$25,000. Others have suggested that VLI should be available to all persons who now buy fixed life insurance. I feel that there is no need to restrict the VLI market. In fact, it may be very appropriate for the monthly debit industry. It may be the only way to offer equity investments to these policyholders. For many companies the machinery is

already at hand to sell and administer this business. In my company we expect that VLI may do some damage to our participating insurance sales, although we do not expect it to hurt our nonparticipating sales, because the premium differential will separate prospective policyholders into two groups—those who want a guaranteed benefit and those who want the opportunity for equity investment growth. In general, we feel that our over-all life insurance market will be expanded rather than remaining constant.

MR. NICKERSON: I would like to express a personal feeling here that we may well initially see VLI sold only in the sophisticated high-amount market. This is only natural because of the substantial training and education which the agent must now acquire to sell a new product efficiently in a new way. In order to make this economical, he will need to sell larger amounts during this training period. As the agents and the companies develop more experience in this market, the average size of the policy may well come down.

MR. RICHARD E. SWAGER: Some reference has been made to the effect of a prospectus on the VLI sale. I think that the prospectus may have a substantially different effect on the marketing of VLI than it has had on the marketing of variable annuities. Although the prospectus does not appear to have been a particular deterrent to the sale of variable annuities, it may be somewhat dangerous to conclude that it will not be a deterrent to the sale of VLI. Variable annuities and VLI may well be sold in quite different markets.

The variable annuity has been sold to a very large degree in the tax-sheltered market, quite often on a group basis. A variable annuity sale is often made to an employer, and the employees are solicited after the actual sale is made. A prospectus is delivered to each employee, of course, but the psychology of that sale is such that the employer is allowing the employee to purchase a very worthwhile retirement income program; quite often there are tax advantages as well.

It is my judgment that VLI products will be sold predominantly to individuals, just as individual life insurance policies are now sold to individuals. In that respect, the delivery of the prospectus may have a quite different effect on the purchaser than the prospectus delivered with a variable annuity. A VLI policy definitely will be a life insurance policy and will be purchased for purposes other than retirement income in most cases.

MR. NICKERSON: On the subject of prospectuses, I would like to report that an industry committee has prepared a set of guidelines for the development of a prospectus. Let me say that they are formidable, much more difficult than the variable annuity prospectus. These prospectus guidelines were submitted to the SEC for review. The SEC responded very promptly, saying, "Thank you very much." They felt that the complexity of the issue made it undesirable to comment specifically on the guidelines initially and indicated that they would wait for the first half-dozen or so actual prospectus filings to be made and then compare their review of these actual filings with our suggested guidelines.

The guidelines have also been submitted to an NAIC committee, and this has resulted in several potential problems. It is too soon to tell whether these problems will be great or small, but there is a strong potential here for disagreement between the SEC and the NAIC regarding appropriate material for a prospectus. The SEC is looking for a prospectus appropriate to the sale of a security, and the NAIC is looking for a prospectus appropriate to the sale of an insurance policy. For example, the SEC has been quite concerned in the past with disclosing the relationships between subsidiary and parent companies. The NAIC, on the other hand, feels that the parent-company relationship is not important to an insurance contract and does not want to imply to the consumer that there is any support for the liabilities of the subsidiary as the result of the presence of the parent company.

MR. PICKERING: The guidelines outline the type of information that must be included in the prospectus. The prospectus includes a cover page and several sections inside. In the inner sections it is necessary to describe, first in general terms and later in detail, exactly how the contract operates in determining death benefits and surrender values. Included in one section are two tables, known as Table A and Table B.

Table A was designed to illustrate for two ages—25 and 40—exactly how the contract works under various assumptions as to investment performance. That is, the customer will be shown, year by year for ten years and then quinquennially up to age 65, the total premiums that will have been paid and the benefits generated by the specific contract being offered under assumptions of investment performance of 0, 4, and 8 per cent. These performances are after federal income tax charges but prior to any other asset deduction. Furthermore, it will be necessary to illustrate the total performance required to maintain a level death benefit using the company's current method for charging for federal income tax. Besides total premiums which must be illustrated, those same

premiums accumulated at 4 per cent interest will be shown. The 4 per cent rate is stated to be approximately what a customer could receive from a savings and loan association after taxes.

Table B illustrates what dividend might be generated under the company's current dividend scale, on the basis of the above assumptions as to investment performance. Later on in the guidelines there is a requirement that an actuary certify that the calculations shown in these tables and in other parts of the prospectus have been made in accordance with the formulas described in the contract.

**CHAIRMAN CHARLTON:** Another item which must be included in the prospectus is a statement regarding the federal income tax effect on the purchase. This could present a possible stumbling block, and an approach to federal income taxes is currently being studied, including the effect on the separate account, the general account, and the combination of the two. I am going to ask one of our audience, Mr. Harry Garber, a member of the industry task force, to bring us up to date on these tax policy developments.

**MR. GARBER:** It is too early to discuss any of the details of proposals which may be made by our task force, and this is a rather sensitive question. However, I will take a few minutes to discuss the general concepts which we have developed. Taxation must be considered both for the individual and for the insurance company. We feel, however, that the Treasury Department must consider these two as a package in order to develop an appropriate tax posture. In general, we have concluded that the individual consumer should be taxed in approximately the same way whether he has a fixed or VLI policy. The company tax, on the other hand, is very complex. The existing tax law does not really fit the situation. It does not really anticipate capital gains and relies heavily on ordinary investment income to generate tax revenue. (In an equity product, capital gains can be expected to represent a much larger portion of total investment income.) Both the Equitable and the New York Life have requested private rulings that VLI reserves be considered life insurance reserves for income tax treatment. Both of these requests have been declined. One SEC official has indicated publicly that legislation from Congress will be needed to handle this question.

The task force has set forth three goals in the development of a recommended tax plan. First, the plan must produce reasonable revenue. Second, it must apply equally to all kinds of benefits. Third, there should be comparable taxation between fixed and VLI products. A specific pro-

posal has been submitted to the ALIA, and all members of that organization will be asked for comment. If it is satisfactory to the general membership, we hope to present our recommendations to the Treasury very shortly.

**MR. WALTER N. MILLER:** I would like to comment briefly on two subjects the panel has touched on this morning. The first is in the area of disclosure. It seems likely to me that the development of regulation for VLI inevitably will have some effect on fixed-dollar regulation. As a possible example, some of the disclosure requirements for mutual funds may have to apply to VLI. I am not in any way recommending that this should be the case, but I am just stating that it is a possibility. For example, there may be some requirement that the agent's commissions be disclosed in the prospectus. If this were required for VLI, it would be very difficult to defend the position that it should not be required for fixed life insurance. The consumer forces of the 1970's seem likely to bring about this kind of disclosure and regulation in any event. The development of VLI may just be an accelerating force.

Second, I would like to touch on the question of marketing. I suggest that unless we all work, individually and collectively, to control and inhibit possible abuses, there could be very severe problems. Consider, for example, the question of replacements. This is one of the most obvious areas where regulatory authorities will be checking to make sure that we are acting in the best interests of the consumer. There are, of course, many other areas of possible abuse.

**MR. PICKERING:** I would like to state that I think it would be a great mistake for regulatory authorities to attempt to require disclosure of commissions on VLI business. The essence of the securities laws is to control charges, not expenses. I believe that it is important for the actuarial and insurance community in general to provide input to direct regulatory authorities in a more useful direction. For example, there has been some talk that the NAIC might suggest a maximum commission scale. I believe that it is our job to talk them out of this. I might also note that at yesterday's meeting of Task Force 5, it was agreed to recommend that the NAIC postpone consideration of guidelines for development of regulation of charges until their December meeting of this year.

**MR. NICKERSON:** Moving on to the subject of product design, there are a number of complex problems, and we may expect various companies to develop differing solutions. A fundamental question is how the

difference between the actual investment performance and the assumed investment rate is to be reflected first in the face amount and second in the cash value. Decisions must be made as to whether policy loans and nonforfeiture benefits are to be handled as fixed benefits with reserves transferred to the general account or as variable benefits with reserves retained in the separate account. Treatment of premiums received during the grace period and the retroactivity of lapse if the premium is not paid will require careful consideration. Each of these decisions, and many others not enumerated, will involve a balance among marketing appeal, administrative practicality, avoidance of antiselection (as to both mortality and investments), and the effect on both expected profits and potential profit fluctuation.

One aspect of product design that has been discussed less frequently is the choice of mortality table to be used in the benefit formula. This role seems to have been assigned to the 1958 CSO table by default. I would like to suggest that the 1958 CSO table may be unsuitable, particularly for nonparticipating policies. At the least, the choice of mortality table for the benefit formula should be examined with the same care as is being given to many of the problems I referred to earlier.

In developing a traditional policy, the role of the valuation mortality table is relatively minor. Assuming that there is no deficiency reserve problem, the principal uses of the table are to determine the minimum required cash values and reserves. In practice, the actual cash values and reserves often exceed the legal minimums. Most important, the 1958 CSO table has relatively little effect on premiums for nonparticipating policies and dividends for participating policies. Since the benefits of the policy are fixed in advance, the redundancies in the valuation mortality table affect the timing with which "real" profit is recognized as statutory profit, while serving the regulatory purpose of minimizing the risk of company insolvency.

Because mortality profits will be recognized through dividends, the choice of mortality table should not produce a serious problem for participating VLI, either. But the problem becomes critically important for nonparticipating VLI!

A company issuing nonparticipating business must have considerable latitude in establishing the guaranteed price it will charge for the risks it is assuming and the services it is providing. In the case of fixed-dollar life insurance policies, the only major determinant of the price being charged is the gross premium, with the scale of cash values having a very secondary role.

In the case of nonparticipating VLI, a very different situation exists. There are three important components of the price structure. First, of course, is the gross premium being charged. Second, the charge made annually against the separate account for investment management, mortality risks, and so on, becomes increasingly important as the pool of assets grows. Finally, the mortality table used to determine benefit changes resulting from emerging investment experience is a third major component of the pricing of the policy. A company must have latitude in each of these areas if it is to be in the same situation in marketing VLI as in marketing fixed-dollar life insurance.

In the operation of a VLI policy, the difference between the assumed investment return and the net investment return credited to the policy is periodically (perhaps daily) applied as a single premium to purchase positive or negative additional insurance. Whatever the form of this additional insurance—paid-up whole life insurance or paid-up insurance decreasing daily over the remainder of life, or any other insurance benefit which meets the legal requirements—the purchase price is the net premium based on the assumed investment rate (AIR) and the mortality table specified in the benefit formula.

The “premiums” charged for the additional insurance purchased with investment profits could, in time, substantially exceed the fixed gross premiums collected from the policyholders. As a result, selection of the mortality table to be used in the benefit formula will be one of the most important product design decisions a company will have to make.

**MR. PICKERING:** Whatever the method used for the recognition of the investment results in surrender and death benefits, it will be necessary to value the assets in the separate account daily. Most companies' contracts will be dated any day of the month, and the contract date is the date from which investment results will be measured. Most contracts that I have seen provide for daily variation of cash values. That is, investment performance from the prior anniversary is credited to the cash value. The determination of death benefits, however, has been developing along different lines in different companies. The New York Life type of design seems to require daily variation in death benefits, in order to avoid a sawtooth effect in the death benefit as premiums are credited to the separate account. The Equitable type of design permits variation in death benefits annually, monthly, weekly, or daily. In my opinion, this will be a hard decision for a company to make—how often to vary the death benefit. It is expensive to vary the benefits frequently, and the amounts of variation may be small, but I think that competition will

force all of us eventually to move to daily variation. With annual variation and the Equitable design, there is a noticeable change in death benefit once the policy crosses an anniversary. With everybody expecting the changes to be positive more often than negative, it will *appear* that the insurance company is absorbing the excess investment performance on deaths between calculation dates. Offsetting this, is the fact that, if the death benefit varies only once a year, the policyholder will know throughout the year exactly what his death benefit is. With daily variation, he will not. Perhaps methods can be worked out to vary the benefit daily but actually make the calculations less frequently.

MR. NICKERSON: I am convinced that the reserve held in the separate account must be the benefit formula reserve. The benefit formula assumes that the dollar amount of investment return earned by the separate account is equal to the benefit formula reserve multiplied by the net investment rate (after all deductions). If the reserve actually held is less than the benefit formula reserve, then the company is in effect supplying or guaranteeing the required additional dollars of investment return through its general account. This would cause no problem if the separate account investment return were lower than, or even modestly higher than, the general account. But the separate account potentially could have a significantly higher investment return, which could produce a serious drain on the general account. In fact, a strong bull market could even drive a company into insolvency if the company were heavily involved with VLI and were not holding the full benefit formula reserves in the separate account. Companies should not, and probably will not be allowed to, assume this kind of risk.

There is less of a problem if the reserve held exceeds the benefit formula reserve, but I still doubt whether this will be permitted generally. I see no way in which this could lead to an insolvency. Since the benefit formula reserve will certainly have to at least equal the statutory minimum reserve, a reserve in excess of the benefit formula reserve is likely to be considered a voluntary allocation of surplus. In view of the investment restrictions which the states impose on general company funds, I suspect that any significant overreserving in the separate account (aside from initial seed money) would be looked on with disfavor.

In my earlier remarks, I suggested that companies may wish to use a mortality table other than the 1958 CSO in their benefit formulas. Just now I insisted that the benefit formula reserve would have to equal or exceed the statutory reserve. These two comments deserve some amplification and justification.

The benefit formula reserve is, of course, the excess of the present value of future benefits over the present value of future net premiums, computed by using the benefit formula mortality table and the AIR. In computing the statutory minimum reserves, the 1958 CSO mortality table must be used. It is important to note, however, that the investment return actually earned (after investment expenses and provision for any tax on investment income) will always exceed the net investment return credited to the policy by the amount of the asset charge against the separate account. I believe that it is both proper and desirable to take into account this "company's share" of the total investment return in determining the statutory minimum reserves. Thus the minimum reserve requirement would be based on the 1958 CSO table at an interest rate that exceeds the AIR by the amount of the asset charge, but using the benefits that would be produced by the benefit formula, its mortality table, and the AIR itself.

At any point in time, the future benefits under a variable life policy may be divided into two components: (1) the fixed and determinable benefits which will be provided if the exact AIR is credited to the policy thereafter and (2) the amounts of positive or negative paid-up additional insurance that will be purchased on a net single premium basis by the differences between the AIR and the net investment return actually credited to the policy. If the net single premiums to be used are adequate, so that no deficiency reserves are needed, then no reserves are needed for component 2 until the additional insurance is actually purchased. Because future variations in the investment return are fully and solely reflected in component 2, component 1 is in fact a fixed benefit plan on which the company is guaranteed to earn an investment return exactly equal to that return which will result in crediting the AIR to the policyholder. In other words, with respect to component 1, the company is guaranteed to earn, after investment expenses and taxes, an investment return equal to the AIR plus the asset charge, no more and no less. I suggest that the test of reserve adequacy for component 1 should be the 1958 CSO table at an interest rate equal to this guaranteed interest return to the company. The test of adequacy of the net single premiums for component 2 would also be the 1958 CSO table at this rate.

Incidentally, this reserve requirement has the effect of determining the minimum mortality rates that may be used in the benefit formula. In a policy where the excess investment return is applied to purchase whole life additions, for example, the minimum value of  $q_x$  at each age can be computed recursively backward from age 100, so that  $A_{x+t}$  obtained by using the AIR and the minimum mortality rates is equal to

$A_{x+t}$  obtained by using the 1958 CSO table and an interest rate equal to the AIR plus the asset charge.

MR. PICKERING: The reason for developing preliminary term methods for policy reserves was to amortize partially the large first-year expenses incurred in issuing a life insurance policy. It certainly was not intended to affect death benefits, and it does not seem logical with VLI to have the heavy acquisition expense affect death benefits. This means that I believe that the death benefit formula used with a VLI policy should be on a net level premium basis. This, in turn, calls for assets in the separate account to be at least equal to net level premium reserves. It does not necessarily follow that the reserve liabilities need to be on the net level premium basis, however. There is as much reason for statutory earnings to provide for partial amortization of acquisition expenses with VLI as there is for fixed life insurance.

Holding assets on a net level premium basis and liabilities on a Commissioners Reserve Valuation Method (CRVM) basis creates statutory surplus in the separate account which might be looked upon with suspicion by some state insurance departments. It might appear that the company is trying to get around the investment restrictions which apply to the general account. With a satisfactory explanation, however, this surplus should be acceptable.

I might note that the cash-value basis logically should not be on a net level premium basis. If a purchaser of a contract changes his mind about wanting the insurance benefit, he can logically expect to be charged for his own unamortized acquisition expenses.

MR. SCHER: I would like to offer the suggestion that product design will affect the death benefits, and it is not absolutely necessary to use net level premium reserves for face-amount determination. The face amount may well be defined on some other basis. In looking at this development, I can see that the insurance departments may well favor face amounts determined on net level premium assets but may allow liabilities on CRVM, with the difference in the separate account being allocated to surplus. On the other hand, it seems clear that they would definitely not allow benefits to be on the CRVM basis but reserves to be on a net level basis. This could be seen as circumventing the existing unauthorized investments restrictions. In general I feel that any basis which is clearly defined in the contract for use in determining face amounts of insurance should be satisfactory.

**CHAIRMAN CHARLTON:** I will now challenge the panel by stating that for substandard VLI we want the same death benefit as we would have for standard life. This, therefore, means that you must keep the substandard reserve in the general account.

**MR. SCHER:** I thought we had convinced the Chairman of the error of his ways prior to this meeting. It seems to me that we must hold the substandard extra in the separate account because the extra risk is dependent upon results of the separate account.

**MR. PICKERING:** I have not found any underwriter who feels that the underwriting should be any different for VLI. Although, presumably, death benefits will be larger under VLI, the formula for determining the benefits is outside the control of the insured, and, therefore, there should not be any opportunity for antiselection.

It seems logical that, as in fixed-dollar insurance, substandard lives should have the same death benefit as standard lives. The entire difference between classes should be reflected in the gross premium. This is not as easy as it sounds. With positive excess performance, the net amount at risk may increase instead of decreasing as with fixed-dollar insurance. In any case, the net amount at risk will not decrease as fast as with fixed. Consequently, the substandard extra premium for VLI should be larger than for fixed life contracts.

With respect to reinsurance, it does not appear possible to reinsure on a straight coinsurance basis. The writing company must hold the separate account assets. Thus only modified coinsurance and yearly renewable term reinsurance methods appear to be feasible. With yearly renewable term reinsurance, it appears likely that the amount of needed reinsurance will have to be estimated at the beginning of each policy year. This means more clerical work than is done currently. All in all, nothing seems to be easier with VLI. Everything is more difficult.

**MR. NICKERSON:** On substandard I would like to go a step further and say that even though you hold the reserve in a separate account, you must vary the benefit. Now this may be difficult to explain, and, in fact, it may be very difficult to sell to substandard risk benefits which differ from those received by a standard risk. Because of the theoretically unlimited potential for increase in the amount at risk resulting from favorable investment performance, I do not see how an extra premium alone could handle the risk on a sound basis. Joe pointed out

earlier that a VLI policy guarantees a formula for determining benefits rather than guaranteeing the actual benefit. This formula will have to reflect directly the substandard nature of the risk.

*San Francisco Regional Meeting*

CHAIRMAN PETER T. LECLAIR: Variable life insurance (VLI) has been a topic for discussion at eleven of the thirteen Society meetings from November, 1969, through the end of 1972, the only exceptions being the two meetings that were devoted exclusively to the special topics of adjusted earnings and pension planning. One might suspect that everything that can be said about VLI has already been said. Recent developments, however, both at the federal and state levels, have brought VLI to the point where we may reasonably expect to have it available on the individual insurance market within the next twelve months. We are now in a better position to consider the questions of "how" and "when" VLI will evolve, rather than "whether" it will.

An important question to life companies in general is the emergence of profit on their contracts. How will this differ for VLI as compared with fixed-dollar life insurance?

MR. EDWARD SCHER: I think that there is a general misunderstanding concerning the nature of margins or profits in connection with VLI. Some of the same sources of profits, such as the excess of loading over expenses that will be realized throughout the life of the policy, and mortality gains, exist in both types of insurance. The concept of gains from interest is perhaps least understood. It is true that all the investment risk essentially is transferred to the policyholder. On the other hand, companies will be making an asset charge to cover investment management fees. In the case of a mutual company, they may well consider making an asset charge in excess of that required for investment management fees, in order to cover mortality guarantees, expense guarantees, and contingency margins, with the result that the excess of the asset charge realized each year over the investment management fee and other costs will be available in the nature of an interest contribution to the dividend. Some of the formulas I developed in my paper were to make explicit the form of those contributions.

The mortality margin, per dollar of gross premium or per thousand of initial face amount, in general will be larger on VLI, assuming that the separate account has performed favorably, than it would be on fixed-dollar life insurance. The difference between standard mortality and

experience mortality might still apply, but to a greater amount at risk because the face amount of insurance has increased.

Some mutual companies, for example, and perhaps stock companies also, may wish to consider establishing the same profit or surplus goals for VLI as they have under fixed-dollar insurance. In other words, it is still possible to construct a dividend scale that is reasonably sloped in order to achieve, in general, the same surplus objectives or goals as we have under fixed-dollar.

MR. PAUL A. CAMPBELL: Ed, I believe you said that it should be possible to achieve the same profit margins under VLI as under fixed benefit life insurance. However, we have heard today of the impact that swings in investment performance can have on profits. I would assume that you have done a good deal of simulation testing on ranges of investment performance. Have you established a statistical degree of confidence in making that kind of statement? Is some level of performance required for profits to be as good under VLI as under fixed life?

MR. SCHER: I do not know that we have made simulation tests, to the extent that you mentioned, to determine the particular surplus that would arise as a result of various separate account performances. Perhaps, as a mutual company, we feel a little more comfortable than a stock company does, because there is a degree of security in the dividend scale.

I might mention that one of the discussions of my paper addressed itself to that point, that is, simulating the stock market performance and determining a frequency distribution of what profits might be realized, depending upon particular levels of gross premium and separate account performances. We have tried to set a dividend scale that would realize surplus goals that were consistent with those of fixed life insurance, and we found that the formulas could be set in such a way that development was relatively stable—to some extent independent of the separate account performance.

MR. BRUCE E. NICKERSON: I would suggest that people who are trying simulations also pay attention to simulations of the model-office type. If the separate account performance is good over the long run, you probably will make a larger profit per policy on a larger volume of business, whereas, if the separate account performance is poor over the long run, you may lose a comparable amount of money per policy, but probably on much less business.

MRS. ROBERTA L. CANFIELD: Even after November, 1969, when actuaries at New York Life demonstrated the actuarial feasibility of VLI, no companies felt that they could issue such a contract within the existing United States regulatory framework, especially the federal securities acts. In order to break the stalemate, the ALC-LIAA (now the ALIA) filed a petition with the Securities and Exchange Commission on November 29, 1971, requesting the adoption of exemptive rules under the federal securities acts for variable life insurance as defined in the petition. On January 31, 1973, the commission released its decision, which granted some of the requested exemptions and opened the door to active development of VLI.

The ALC-LIAA restricted their request for exemptions to VLI which fulfills four requirements: (1) it provides insurance coverage for the whole of life—this eliminates term or endowment insurance; (2) it provides a guaranteed minimum death benefit at least equal to the initial death benefit; (3) it has a gross premium in any year less than a certain percentage of the death benefit in that year—this requirement, in effect, limits the portion of the premium which could be considered pure investment; and (4) it is wholly regulated by the state insurance departments.

Other products which could be called VLI but do not fulfill the above requirements may be issued if they meet all legal requirements, but they do not have the advantage of clarification of status under the federal securities acts.

Potentially, VLI, if treated as a redeemable security issued by an investment company, could be regulated by the SEC under the federal securities acts from four different angles. (1) The VLI contract could be regulated as a security under the 1933 Securities Act. Primarily this would require proper and complete disclosure of relevant information before an application could be taken through a prospectus delivery requirement and restrictions on permissible advertising. (2) The sale and distribution of these contracts could be under the jurisdiction of the 1934 Securities Exchange Act. Basically this means that VLI would be classed as an over-the-counter security and could be sold only through registered brokers/dealers. (3) The separate account on which the variable benefits are based could be governed as an investment company under the 1940 Investment Company Act. This is the most restrictive of the potential regulations. It would impose an artificial structure on the separate account by giving ownership of the assets and ultimate control through voting rights to the contract owners. Management of the separate account would rest in a board of directors, elected annually by the

contract owners, a majority of the members of which must meet strict tests of independence from the insurance company. Other restrictive requirements of the 1940 Investment Company Act include pricing requirements on the sale or redemption of contracts, sales load limitations, and forced daily fund valuation. (4) Finally, the SEC could regulate the entity which actually manages the investments of the separate account as an investment adviser under the Investment Advisers Act of 1940. Primarily this act requires periodic reports of the personal investment transactions of the officers, directors, and certain employees of the investment adviser. Regulation under the Investment Advisers Act would impose no new restrictions in many cases, since a number of insurance companies (or affiliates of insurance companies) are already registered as investment advisers with respect to managing variable annuity separate accounts or in-house mutual funds.

The ALC-LIAA petition requested an exemption for VLI under each of the above securities acts. The SEC agreed to the exemptions under the Investment Company and Investment Advisers acts but did not exempt VLI from the Securities or Securities Exchange Act. The commission concluded that the protection to the insureds through disclosure requirements and supervision of sales personnel not only is appropriate but is necessary in view of the complex nature of the product. The commission concluded not that the protections afforded by the Investment Company and Investment Advisers acts were inappropriate but rather that substantial revision of the acts would be necessary in order to cover VLI, and anticipated state legislation would cause redundancies in regulation.

Consequently, the SEC delegated the responsibility of regulation of the separate account and its investment adviser to the state insurance departments. Specifically, the SEC expects state legislation in the following areas: (1) valuation of portfolio securities in a uniform manner, (2) distribution of information annually to contract owners substantially similar to that provided by proxy statements and annual reports under the Investment Company Act, (3) protection against unauthorized or improper changes in investment policies, (4) protection against excessive sales, administrative, or management charges, and (5) restrictions on transactions with affiliates. As an impetus to the development of these regulations, the SEC has emphasized its intention to revoke or modify the exemptions if necessary. Only time will tell whether the myriad state regulations in this area will help or hinder the development of VLI.

**CHAIRMAN LECLAIR:** Bruce, would you bring us up to date on what has happened with the SEC since that time?

MR. NICKERSON: Much has been happening, but there are still many areas where no major decisions have been made. In her final comments, Mrs. Canfield referred to the five areas of regulation which the SEC specifically delegated to the states under the 1940 act. Various industry committees have been meeting and discussing these. The NAIC is meeting in Washington this week.

I understand that on the four less actuarial aspects of this regulation the industry was prepared to make recommendations to the NAIC. These have been discussed with NAIC committees, and the NAIC might well take action today. The toughest problem has been the subject of protection against excessive management, administrative, and sales charges. We expect that no action will be taken on this by the NAIC at this time for the simple reason that neither the industry nor the NAIC nor anybody else really has been able to reach a thoroughly satisfactory solution.

Possibilities have included direct expense control, although it is noted that the Investment Company Act deals not with the expenses that the companies incur but with the charges that they make. Price control of some sort might be involved—possibly direct control or possibly control through some type of nonforfeiture law modification.

Confusion and disagreement are the order of the day. It is hoped very much (and many people are spending many hours trying to accomplish this) that a model regulation can be adopted by the NAIC at its December meeting. Once the NAIC acts, the problem still is not solved. The NAIC is solely an advisory body, and action must be taken by the individual states to accept and implement, to modify, or to reject whatever the NAIC recommends.

Furthermore, a suit led by several major mutual fund companies challenges the SEC ruling. I have heard no indications that the suit will be resolved before December of this year. The mutual funds are claiming that the exemptions from the two 1940 acts are improper.

An industry committee of the ALIA submitted to the SEC in April a draft prospectus format which the industry felt would be appropriate for disclosure under the 1933 Securities Act for VLI. We received a very rapid response from the SEC on the prospectus. The response, in essence, said, "Thank you very much. We appreciate all the work that has gone into it. We suspect it will probably be useful; however, it is our intention to consider on an individual basis perhaps half-a-dozen individual prospectus filings by companies and get a better feel for the problem. At that point, we will come back and take a much closer look at what you have proposed."

Another area where substantial activity has been taking place involves

the problems of federal income tax treatment of VLI, both to policyholders and to insurance companies. It appears that the problems of taxing insurance companies will be substantially more difficult to solve than the problems of taxing the policyholders.

The current insurance company federal income tax law was designed for a very different product. If you attempt to apply it directly to VLI, you obtain what appear to be extremely irrational results. Depending on one's interpretation, the direct application would seem either to produce an unacceptably low tax (and in some cases conceivably even result in the reduction of a company's over-all tax bill) or to produce an intolerably high level of tax, substantially in excess of the level of tax that currently is generally paid on fixed benefit life insurance by insurance companies.

Industry committees are probing ways to achieve an objective of substantial parity between the two forms of insurance. There is good reason to anticipate that a proposal will be submitted to insurance companies for exposure and review in the near future.

Although the tax situation does not create a legal impediment to the sale of VLI, a company that goes into the business before this situation is clarified will be assuming a substantial unknown risk.

MRS. CANFIELD: Although the SEC has now decided not to look at these prospectus guidelines with an eye toward adopting them and refining them, I would guess that the industry itself is going to use them as they develop their own prospectuses. Under the guidelines, the prospectus would give the same information which you see currently in a mutual fund or variable annuity prospectus; but the format of it, hopefully, will be more readable. The cover page disclosure would be very brief, touching upon only the most important points.

The first section of the body of the prospectus would be a concise, nontechnical summary of the principal policy features; general information regarding the determination of dividends, premiums, and expenses; and a general discussion of the investment objective and of the management of the separate account. There would be numerous cross-references to the more technical information contained elsewhere in the prospectus.

The second section would be a tabular illustration of premiums, death benefits, cash values, and (in a separate table) dividends, if applicable, using hypothetical investment returns of 0, 4, and 8 per cent. Another percentage equal to the asset charge plus the assumed investment rate

(AIR) would also be used. Actual investment results for the preceding ten years would also appear. Of course, initially there would not be any.

The third section of the prospectus would provide detailed technical information, such as an illustrative computation of how policy benefits vary, investment restrictions, placement of brokerage, and background information on the directors and executive officers of the registrant, that is, the insurance company.

Finally, the fourth section would be the financial statements of both the insurance company and the separate account.

The prospectus as it was outlined by Task Force 5 has a few major differences from existing prospectuses. First, it includes hypothetical investment performance illustrations. To date the SEC has not permitted this with variable annuities. Second, no numerical percentage of premiums paid is designated specifically as the sales load or expense charge. In particular, in the draft, compensation to the agent is not disclosed. The tabular illustrations, however, do show accumulation of premiums and thus encourage a comparison of the accumulation of premiums with cash values and death benefits. This comparison can be used to give a rough idea of the impact of the mortality cost and expenses.

MR. NICKERSON: These guidelines, after having been submitted to the SEC, were also submitted to a subcommittee of the NAIC. We received a fairly rapid preliminary response from the NAIC, which indicates that, regardless of what the SEC does, the prospectus problems are far from over. In certain areas the NAIC subcommittee did not seem at all happy with the prospectus guidelines.

The subcommittee commented, for example, that the cover page was far too crowded and did not indicate sufficiently clearly that the contract was an insurance policy. For another example, the SEC has traditionally required certain information to be given about a parent organization when a subsidiary is issuing a security. The NAIC subcommittee points out that, since the parent is not liable for supporting the guarantees under the policies, the only purpose of such a reference appears to be to mislead the potential policyholder by reference to a prominent parent.

Also, the guidelines require certified financial statements for the insurer and the separate account. The NAIC committee thinks that "generally accepted accounting principles" financial statements would be misleading with regard to VLI. The policyholder is not buying shares of the insurer. Thus he is not concerned with the insurer as a going concern as much as he is concerned with it as a last resort in paying his policy guarantees.

**CHAIRMAN LeCLAIR:** Although this response by the NAIC body does create some problems, I think it is gratifying to see them taking a position as rapidly as they have. Their committee has done a good bit of work on this and a good bit thinking in a short period of time. But it does indicate that there are going to be some interesting challenges ahead of us in trying to satisfy the SEC and the states.

There are varying opinions within the industry as to what the sales impact of VLI is going to be. Some companies are very optimistic. Other companies feel that it is going to take a long time to get started and in fact the sales may never amount to much.

**MR. SCHER:** I will start off by making some comments in regard to the prospectus which was just discussed. I think there is no doubt that the prospectus, in whatever form it comes out, will have much valuable information that can be used by a prospective purchaser in comparing different products. However, there is also no question in my mind but that it will take a fairly sophisticated purchaser to make really good use of the facts and figures at his disposal. Many people, even sophisticated people, do not do that much comparison shopping. So the prospectus will be more in the nature of an added expense and perhaps an initial burden for the agent and the company, but it will probably not be much in the way of an obstacle or a help as far as the sale of VLI goes.

In connection with the salesmen, there are various things that will come up in connection with VLI. There is the licensing requirement. Of course, a tremendous educational effort will be required, not only of the salesmen but of home office people in general, and of the buying public.

I think that the people who will buy variable life insurance will be much the same buying public that buys fixed-dollar life insurance. At least at the outset, the great majority of sales of VLI will be sales that would have been made on a fixed-dollar basis. However, I think that the total sales will be greater overall, since, at the introduction of any new product, there is always a problem of replacement, whether within one's own company or in another company.

**MRS. CANFIELD:** I would like to give a rough idea of a somewhat pessimistic viewpoint. I think that this product is going to be regarded initially as some sort of gimmick. It has an equity kicker in it that has not looked too good these past few months.

Initially it probably will compete only with similar products. In par-

ticular, the mutual funds market is an obvious one for VLI sales to infiltrate. Variable life designs which emphasize the cash-value sensitivity to investment performance rather than the death benefit sensitivity would be particularly successful in this area. Variable life insurance may, in the near future, supplement schemes which already combine insurance and mutual funds, such as "buy term and invest the difference" or "buy permanent and borrow on the cash value to put money into mutual funds."

Variable life will also be an extremely keen competitor of fixed-dollar insurance in the near future, especially if the tax situation works out favorably from a policyholder's point of view.

MR. CAMPBELL: I would like to offer a different opinion on the marketing impact of VLI. One thing that should be made clear is that we are not dealing only with our own sales force for distribution of VLI. Brokerage houses all over the country regard VLI as a possible cure for their own lag in sales results. A recent seminar in New York emphasized very dramatically the marketing implications of this distribution system on VLI, and the effect it might be expected to have on the sales training and marketing techniques that we have established for traditional products. I am concerned about the impact of brokerage houses linking their marketing people to insurance "manufacturers."

I think we shall find that our problems with marketing will relate to preserving our fixed-dollar position. We have to wear two hats as actuaries—both developing VLI and maintaining fixed-dollar insurance; we constantly need to be aware of what VLI development can do for and to our fixed-dollar industry.

I think that there will be a tendency to oversell VLI at the beginning, that the prospectus will not be relied on as much as it should be, and that the glamor resulting from the press treatment of VLI so far is going to make this product "take off" if it does clear the IRS and the SEC.

MR. HAROLD CHERRY: Does anyone here think that the so-called Dutch design, which is fully variable not only in the face amount but also in the premium, might be viable from the marketing point of view?

CHAIRMAN LeCLAIR: At Aetna Variable we feel that the variable premium design has a very definite place. We feel that it might be marketed successfully in higher-income groups, depending on how things work out with the IRS and with the states.

MR. SCHER: I think there is no question but that it is probably the most easily understood of the VLI designs in terms of the writing of a policy form and in terms of the mathematics involved. There is no question about its simplicity. I think there is a great question with regard to its salability. I do not think that it did very well where it was originally developed.

MRS. CANFIELD: I would like to make two points with reference to product design. First, especially for a nonparticipating company, I think that there is a real danger of this product's having too high a premium rate. I think that in designing the product each company should look at how it will fit into their existing administration systems and how it can be combined with their fixed-dollar or their existing equity products. This should be a primary rather than a secondary emphasis.

Second, I think something that is overlooked in the design of VLI is the investment policy of the separate account. Usually, VLI is considered only in terms of investments in equities. I think the assets of the separate account could be diversified between investments of the fixed-dollar type and equities in order to provide a more stable return. This would still pass the investment experience on to the insured, but it would provide a more stable growth in the death benefits and still be quite in line with the philosophy of the company.

CHAIRMAN LECLAIR: The topic of "timing of recognition of investment results" is quite closely related to accounting problems and the transfer of funds. Ed, would you like to treat these topics together?

MR. SCHER: The question of what period one should choose in recognizing investment results depends upon a number of factors. Presumably, one thing that we would like to avoid is abrupt changes in the death benefits from one valuation period to another. Second, there is the question of equity among different policyholders. Third, there is the question of the expense and practical problems associated with very frequent changes in the death benefit.

This has another side to it. If one decides to change the death benefits daily, this does not mean that one has to perform calculations on a daily basis. It means that one *deems* the death benefit to be changed daily, but there is no need to perform the calculations in real time on that basis. In other words, one can maintain a file of net investment factors throughout the year and actually change the death benefit in the computer only once a year—at valuation time, or at the time of a death,

or when other transactions make it necessary to do so. At that time all the calculations needed to bring the file up to the present date could be made, reflecting the fact that the death benefit was in fact changed daily.

Another factor relating to timing of recognizing changes is the relative responsiveness of the design. The so-called Equitable or paid-up design is relatively unresponsive in the early years. Because the changes in death benefits are in general relatively small, there is less need to recognize change as frequently. In the case of the New York Life design or the fully variable design, the changes are much larger, and, if one is to avoid abrupt changes, one has to recognize the results more frequently.

Regardless of how frequently the death benefits are changed, companies presumably will have to value their funds daily in order to take into consideration the changes in the cash values. If one does not do so, he may be subject to antiselection on behalf of the surrendering insured.

Even if one changed the death benefit once a year, the fund would still have to be valued daily unless the issuance of policies is to be restricted to one a day a year. As long as policies are issued throughout the year, one must be in a position to measure the effect of a policy-year change in investment results from whatever date it is issued. Therefore, one is put in the position of having to value that fund daily. That cannot be escaped unless the days on which policies are issued are restricted.

CHAIRMAN LECLAIR: Wouldn't it be possible to escape this by having the company assume a certain amount of the investment risk? In other words, even if you dated policies at various times, for calculation purposes your policy could provide that the investment experience will be on the calendar-month basis, for example.

MR. SCHER: Yes, if the company is willing to assume the investment risk. To the extent that one is not valuing daily, one is on that investment risk.

CHAIRMAN LECLAIR: The question of maintaining reserves on a basis different from the benefit formula basis is a rather interesting one.

MR. NICKERSON: I am convinced that the reserve that is held in the separate account must be the benefit formula reserve. The benefit formula itself assumes that the dollar amount of investment return earned by the separate account is equal to the benefit formula reserve multiplied by the net investment rate after all deductions. If the reserve

actually held is less than the benefit formula reserve, then the general account is in effect supplying or guaranteeing the required additional dollars of investment return. This could lead to the interesting situation of a strong bull market throwing the company into insolvency. I do not think that companies will be allowed to take this kind of risk.

There is less of a problem if the reserve held exceeds the benefit formula reserve, but I still doubt that this would be permitted to a significant degree. The reserve held in the separate account will not be subject to the general investment restrictions applicable to the company. I suspect that any significant overreserving in the separate account, aside from initial seed money, would be looked on with disfavor by the insurance regulatory authorities.

The benefit formula reserve is, of course, the excess of the present value of future benefits over the present value of future net premiums computed using the benefit formula mortality table and the assumed investment return. In computing the statutory minimum reserves, the 1958 CSO mortality table must be used. It is important to note, however, that the investment return actually earned after investment expenses and provisions for any tax on investment income will exceed the net investment return credited to the policy by the amount of any asset charge. I believe that it is both proper and desirable to take into account this company's share of the total investment return in computing the statutory minimum reserve.

Thus the minimum reserve requirement could be based on the 1958 CSO table at an interest rate that exceeds the AIR by the amount of this asset charge, but using the benefits that would be produced by the benefit formula, *its* mortality table, and the AIR.

This type of approach to reserves does have the effect of determining the minimum mortality rates that can be used in the benefit formula. In a policy where the excess investment return is applied to purchase whole life additions, for example, the minimum value of  $q_x$  that could be used in the benefit formula can be computed recursively backward from age 100, so that the net single premium using the assumed investment return and the minimum mortality rate is equal to the same function using the 1958 CSO table and the higher interest rate.

MR. SCHER: Some insurance department people I have talked with seem reasonably amenable to having the reserve maintained on a basis lower than that reflected in the benefit formula. I understand, however, that at least one company submitted such a policy, and it was rejected by California and Illinois.

## POLLUTION, POPULATION, AND THE QUALITY OF LIFE

### *St. Paul Regional Meeting*

1. What contributions have individual actuaries made to environmental causes, either on their own or as part of a corporate effort of their employers?
2. What further contributions could actuaries make?

CHAIRMAN EDWARD A. LEW: In my judgment, the most perceptive comment on the subject of this session was made in 1970 by Philip Handler, president of the United States National Academy of Sciences, who remarked: "The growing wave of public concern for the quality of the environment has been aroused, in large measure, by scientists who exaggerate the all too genuine deterioration of the environment; who, seemingly, seek to have national policy made by reiteration of horror stories, when what is required is quantitative, scientific evaluation of the real, but as yet unknown dimensions of these problems."

Much legislation intended to improve the quality of the environment has been passed by the United States Congress since that time. Thus, Congress early in 1970 enacted the National Environmental Policy Act, which calls for a comprehensive assessment of all federal government projects with the object of minimizing environmental contamination to the maximum extent feasible. The same year, Congress set up a Council on Environmental Quality as an advisory body, and in December, 1970, it established the Environmental Protection Agency and gave it full authority over various functions relating to safeguarding the environment which were previously scattered through a number of government bureaus. The Clean Air Act of 1970 prescribed national standards for air quality and placed limits on the amounts of specified pollutants to be met by April, 1975; it applies not only to air pollution originating in industry but also to automotive emissions and all new sources of air pollution. The Water Pollution Control Act of 1972 has similarly provided that industrial plants, sewer systems, and operations in agriculture must take steps to control their effluents and install the "best practicable" equipment within five years and the "best available" technology within ten years. The Pesticide Control Act of 1972 requires manufacturers of pesticides to register their products with the Environmental Protection Agency, while the Noise Control Act of 1972 calls on the

Environmental Protection Agency to promulgate noise emission standards by April, 1974. The Occupation Safety and Health Act of 1970 has given the federal government substantial powers to police occupational health and related hazards by promulgating standards and authorizing the secretary of labor to inspect and investigate working conditions in industry. The country thus unequivocally has committed itself to a cleanup of air, water, solid waste, pesticide, and noise pollution, as well as to the elimination of occupational health hazards.

With all this detailed and complex legislation on the books, it will take several years to establish realistic antipollution regulations and begin to implement the commitment to improve the quality of the environment. We can be reasonably sure that incidents of serious environmental contamination will continue to receive adequate publicity, but we may not be as well posted on the measures that succeed in arresting or reversing deterioration of environmental conditions. For instance, little attention has been given to the fact that many years ago Pittsburgh succeeded in greatly reducing air pollution from the industries centered in the city or that the heavily contaminated Lake Washington, near Seattle, was after intensive effort recently returned to something like its former state; scant notice has been taken of how London got rid of its pea-soup fogs and cleaned up the Thames. By any historic standards, public health has reached new highs in the United States; there are no indications of uptrends in morbidity or mortality that can be traced to increased air or water pollution. While lung cancer death rates continue on the rise, this is related predominantly to excessive cigarette smoking in the past. The incidence of chronic respiratory diseases has likewise been increasing, and here too smoking is believed to have played a major role. Infectious hepatitis has for some years now been reported with mounting frequency, but its etiology is obscure and is complicated by the effects of growing drug addiction, while the toll it exacts is negligible compared with that arising from the waterborne diseases at the turn of the century.

The current forms of pollution are in large part due to new technologies and rising standards of living, exemplified by modern industrial processes on a vast scale, the enormous volume of inorganic wastes from high consumption, the unprecedented concentrations of automobile traffic, and, in the offing, the hazards of radioactivity as more and more nuclear power plants are built. A great deal of thought needs to be given as to how these developments might be controlled so as not to affect health conditions adversely. The actuary is one of the professionals who can be called upon to help evaluate the effects of new sources of en-

vironmental contamination on health, inasmuch as he can bring to bear on this problem his experience with follow-up studies and his perception of the dilemmas involved in weighing the benefits of low morbidity and mortality against the economic costs of the measures needed to achieve them. The control of pollution inevitably poses the question of the extent to which the public is willing to tolerate some degree of pollution to maintain high standards of living.

The responsibility for the initial identification of the factors suspected of causing environmental contamination and for the formulation of feasible remedies rests primarily in the hands of various scientists, engineers, and other specialists. The actuary can, however, make a significant contribution toward validating the identity of the suspected factors. Since multiple factors and complex relationships among them are likely to be present in environmental pollution, the role of a particular factor may be difficult to isolate; the characteristics of the population under study must be critically examined, suitable statistical strategies devised, and spurious correlations cautiously guarded against. If the further objective is to demonstrate a probable cause-and-effect relationship between some particular factor and increased morbidity or mortality, care must be taken to assess the strength of the association and to determine how highly specific it is and the extent to which it persists with time, whether the factor evinces a reasonable biological gradient, and whether its removal results in a reduction in morbidity and mortality to something like normal levels. It may not be possible to attribute higher morbidity or mortality solely to a particular factor in populations subject to various adverse conditions, as when pollution is found in poor neighborhoods, where harmful habits, such as drug-taking, heavy drinking, and the like, are common.

We need a far better understanding of the ways in which various pollutants operate and what physiological effects they produce singly and in combination with other factors. Such ripe knowledge may still be a long time off. In the meantime, we will have to do the best we can with epidemiological studies of human populations and with animal experiments. The actuary's training in appraising changes in morbidity or mortality in insured populations should stand him in good stead in tracking down harmful effects that become manifest in small groups after a lapse of time.

Some very troublesome questions arise in epidemiological studies of human populations. To what extent, for instance, should we concern ourselves with adverse effects too minute to be detected by the usual techniques in an average community; such effects, while unnoticed in

an average community, might perhaps show up in a wider area over a longer period of time. Similarly, to what extent should we concern ourselves with adverse effects that may be potentially catastrophic in the long run, although they are hard to put one's finger on or to understand in the short run. To answer such questions, it is necessary to set up appropriate monitoring systems in populations sufficiently large so that at least some adverse physiological responses may become manifest in a relatively short period of time. The Environmental Protection Agency has acted to set up such environmental surveillance systems, while the National Center for Health Statistics has tried to develop more sensitive methods for pinpointing the occurrence of rare diseases.

In summarizing the papers presented at a special symposium on epidemiological studies of pollution, Professor J. Neyman of the University of California at Berkeley suggested that a comprehensive investigation of the health effects of pollution ought to begin with a meticulous determination of the adverse parameters in different pollutants; it should be based on a judicious selection of localities for investigation, should review beforehand the health data available in the communities chosen, and should place the responsibility for the study on a team of experts willing to live with the problem for a number of years. It must be particularly sensible to the fragmentary nature of our current information about the health effects of different pollutants and must beware the many pitfalls in the interpretation of the findings, if only because of the incompleteness of the data likely to be developed, the problem of competing risks, and the natural propensity for coming up with spurious correlations.

Aside from indictments of specific pollutants, considerable blame for environmental contamination has been placed on rapid population growth. The evidence suggests, however, that such contamination is apt to arise in any urban area with high standards of living and advanced technologies, as is illustrated by the pollution and congestion recently observed in the larger cities of Australia. If our concern is primarily with the next decade, then rapid population growth is unlikely to exacerbate appreciably the deterioration of the environment in the United States or in western Europe, but in the long run the number of people on this finite planet may well turn out to be the ultimate factor.

Another aspect of environmental pollution has been its effect on the "quality of life." The concept of "quality of life" is hard to define and even harder to measure, but considerable effort has nevertheless been devoted in recent years to developing "social indicators" that might facilitate qualitative judgments about the circumstances under which we

live, as exemplified by the medical services available to us, the educational and recreational facilities at our disposal, and the threats posed by the criminal activities around us. The development and interpretation of statistics that might serve as social indicators of health, education, and crime present great difficulties, inasmuch as they involve highly subjective perceptions and fallible assumptions about human behavior. While there is substantial agreement that many qualities of life are highly desirable, the attainment of some is inconsistent with other generally accepted ideals (such as nonabridgment of individual freedoms), while certain social objectives such as divorce and abortion remain highly controversial.

As a matter of practical priorities, we need to turn our attention first to those problems of environmental contamination on which there is already a reasonable consensus. Whether we function as individuals, as officials of insurance companies, as independent actuarial consultants, or as representatives of the Society of Actuaries, we can engage in many constructive activities that will assist in improving the quality of the environment. John Biggs will tell us how this can be done in an individual capacity, Fred Seltzer will speak as an officer of a large mutual life insurance company that has long had an interest in environmental problems, Louis Weinstein will comment as a member of a firm of consulting actuaries, and Newton Bowers will indicate what the Society of Actuaries might be in position to do through its Committee to Co-operate with Governmental Demographic and Statistical Agencies.

MR. JOHN H. BIGGS: What can an actuary do as an individual toward improving the quality of the environment? Judging from the response to Dick Robertson's mailing, not many actuaries are claiming that they do much individually—my qualifications were especially outstanding, since no one else reported that they were doing anything! This confirms what another Missourian once said: "Everyone complains a lot about the weather, but nobody does anything about it."

What I find difficult in telling of my own individual efforts is to identify the particularly "actuarial" element in those efforts. They tend to be more those of the general citizen than those of the actuary. Before I tackle this difficult question, I would mention one clearly actuarial role. During the last two years I have been chairman of the Society's Committee on Review and have made special efforts to introduce into our *Transactions* reviews of selected significant books on the subjects of pollution, population, and the quality of life. I recommend two outstanding reviews in the 1972 Annual Meeting Number, one by Francisco Bayo

on *Limits to Growth*, the important Club of Rome text on the problems of exponential growth rates in a finite ecosystem, and another by Abe Niessen on the controversial presidential commission report, *Population and the American Future: The Report of the Commission on Population, Growth and the American Future*. *Limits to Growth* also will be reviewed in *The Actuary* in a fine review by Dave Williams nicely titled "Growth: Man's Dream, Mankind's Nightmare." In his review Mr. Williams includes the following pointed question about the actuarial role in ecological questions: "It is hoped that such an accusation [i.e. of too narrow a perspective among policymakers] cannot be directed at the members of our profession. We are self-styled futurists, using our mathematical skills to define, analyze and solve complex business and social problems. We have embarked upon the wide-ranging Project 2 with a view to countering the effects of those tidal forces which are shaping our destiny. Yet how is it then that the MIT report, though published in 1971, has not been discussed at any Society meetings?"

Hopefully the discussion will partly answer that question and will be an important beginning to a broad actuarial interest and contribution to policy-making in environmental matters. What can an actuary do about pollution, population, and quality of life? There are numerous activist organizations that doubtless some actuaries have joined. They have many different aims and objectives, and many make constructive local and national contributions. My family happens to love canoe camping on the wild, spring-fed Ozark streams, and we tend to view the Army Corps of Engineers and their proposed lakes as a very hostile force. We claim no objectivity on that subject, but we also recognize that our interest is not a global issue. Coalitions for the environment, local chapters of Sierra Clubs, and open space councils exist in most communities and can satisfy the tastes and temperaments of most activist actuaries.

My abiding interest has not been in these areas, however, but rather in the so-called information movement, a movement which, I submit, should have a very particular appeal to actuaries. My best means of describing the information movement is to tell a little about our St. Louis group, which is called the Committee on Environmental Information.

1. Our St. Louis committee is one of several such committees operating in major cities throughout the country. The necessary components of a good committee are an active scientific group—assembled rather easily in most cases from a local university—and an organized scientist-citizen board to provide management and financial support. I see the actuary as a valuable

member of that scientist-citizen board, although possibly making a scientific contribution to his scientific division. The local committees are loosely confederated under the national aegis of the Scientists Institute for Public Information (SIPI).

2. The purpose of our committee is to provide the public with solid, objective scientific information on environmental problems. We feel that the public has a right to accurate data and then an obligation to make the difficult choices. We are extremely suspicious of experts and bureaucrats who make decisions without widespread public information and widespread exposure of their proposed intrusions into the environment. The history of nuclear experiments is full of appalling mistakes that were made but could have been avoided if information had been widely disseminated.

We struggle continuously within our group to avoid political judgments and the consequent loss in credibility to major portions of the community.

3. We are extremely proud of the results our St. Louis group has achieved. Among our specific achievements, which illustrate what such a local group can hope for, are the following:

- a) During the 1950's and early 1960's our scientists were among the scientific leaders in focusing attention on the hazards of fallout and radiation. Our physicists were the first to measure the level of strontium 90 in milk and to provide the public with information as to possible consequences. A remarkable illustration of scientist-layman cooperation emerged from this effort. It was clear to all that much better data had to be accumulated on strontium 90. In previous generations, there was no strontium 90 in children's teeth—indeed there was no strontium 90 on earth. Our committee began a baby tooth survey and obtained the co-operation of thousands of children, and their parents, teachers, and dentists, to gather more than 325,000 baby teeth. Letters addressed simply "Tooth Fairy, St. Louis" reached their destination in our office. The record that our collection made permitted Washington University scientists to trace the absorption of strontium 90 in the teeth of children as atmospheric testing rose and fell. Bones, like teeth, incorporate strontium 90, but the bones remain in the body, while the baby teeth come out. We made it possible to understand the whole course of strontium 90 from fallout to food to body, some to be excreted, some to remain in the bones and teeth. We think that this particular informational effort, based on solid, reliable data, made an immensely important contribution to the public demand for responsible international policy on nuclear testing.

- b) In another effort, our committee's monthly newsletter grew from one page to two, to four, to eight, until it blossomed into the magazine *Environment*, with a major national circulation. It finally outgrew us, with a budget of \$500,000 last year, and so we transferred it, debts and all, to our "parent" group, SIPI. Now that it has been transferred, we have started a new one-page newsletter.

- c) Our major current efforts in 1973 are to reach two new audiences of what President Nixon called "environmental illiterates": high-school students and labor unions. Our first course material for high-school students describes the hazards of various external cosmetics that they might buy and the scientific validity of advertisements for them. We now provide for labor journals a biweekly column describing environmental concerns and problems for labor union members. Both of these efforts have been financed by major grants from the federal Office of Environmental Education.

Those are several examples of what our committee has done. I would hope that this description might encourage others to set high goals for what their local group of scientists and citizens (and actuaries) might do. What is the particular contribution that an actuary can make to the "information movement"?

1. Keeping information scientific, reliable, factual, and verifiable is extraordinarily difficult. Scientists become authoritative politicians very quickly, and their "pure information" objective can be quickly forgotten. An actuary is better qualified than most to examine the position of the physicist or biologist who claims to have discovered a new environmental contaminant.
2. The scientists need to be understood, and unfortunately some of the important issues are extraordinarily complex. An actuary's training in the broad field of social science is a necessary ingredient in the acquiring of this comprehension.
3. I think that we have an important role to play in finding the optimum balance between the uncompromising scientist and the hard-pressed industrial or agricultural community. An objective and careful ecologist ought occasionally to come to the defense of a beleaguered businessman. An actuary can remind scientists of this need.
4. An actuary can provide management and leadership to an organization, particularly in financial planning and control.
5. The actuary can understand the systems approach and can think in the radical terms so often necessary to find environmental solutions—for example, recognizing that piping human wastes out to the side of the city and then applying massive amounts of power to them may not really make sense; that power plants may be better built in the center of huge populations so that the by-product heat can be used; that exponential growth in energy use cannot continue; and that solving the energy crisis means not only digging more wells but finding ways to reduce the use of energy.

I find the information movement, as opposed to the activist movement, much more responsible and more substantial. An actuary trained in careful measurement and quantification feels more comfortable in this

effort than in, say, litigating site decisions for public utilities. I do not see for myself a role as a demographer investigating the complex health effects of pollution, although clearly this would be an exciting and appropriate role for an actuary. For many of us our contribution must be after-hours efforts as intelligent citizens. For those actuaries I commend a role in the environmental information movement as a constructive one.

**MR. FREDERIC SELTZER:** In 1909 Metropolitan launched a health and welfare program for its policyholders with the object of life conservation. This involved major public health and educational efforts to control certain airborne diseases, waterborne diseases, and food and other kinds of pollution. In 1911 the Statistical Bureau was organized to study the mortality experience of the company's policyholders and to keep and maintain accurate records necessary to evaluate progress and problems in public health developments.

#### AIRBORNE DISEASES

The company decided to first attack tuberculosis. In 1909 this disease accounted for about one in five of Metropolitan's death claims. At that time crowded living and working quarters, poor sanitary conditions, and polluted air were among the disease's greatest allies. A pamphlet entitled "A War upon Consumption" was published in ten languages. It described the spread of the disease generally by inhalation or contact with the bacillus and the importance of personal hygiene, proper nutrition, and clean fresh air. Cleanliness in food handling and the use of pasteurized milk was also stressed.

Eventually thirty million copies of the pamphlet were distributed, health advertising was instituted, and a sanatorium for company employees was operated at Mount McGregor in New York's Adirondacks. Mortality from tuberculosis fell from an average of 124 per 100,000 among active and retired employees in 1919-21 to 51 in 1928-30, to 24 in 1938-40, and to 9 in 1950-51, about half that in the general population.

In addition to health pamphlets (later, films, filmstrips, exhibits, and displays at professional meetings) as tools for advancing public health, the town health demonstration was devised, in which a community was selected to serve as a laboratory to test public health measures. In 1916 the company launched a demonstration in Framingham, Massachusetts, to show how such a community with an average tuberculosis problem could control the disease through the acceptance of reasonable rules of health, periodic examinations, and treatment where necessary. The Na-

tional Tuberculosis Association joined with Metropolitan Life in carrying out this project.

In the ten years before the demonstration (1907-16), the city's death rate from tuberculosis had averaged 121 deaths per 100,000 people; by 1923, when the project closed, the tuberculosis mortality had been cut 68 per cent, to 38.2 per 100,000. As a secondary result, the infant mortality and general death rate also decreased over the same period. The results of the program were striking and proved that, by putting to use the knowledge available at that time, a typical American community could control this disease. Demonstrations fashioned after Framingham were held in cities across the United States, in Canada, and in Europe. Textbooks still hold up the Framingham demonstration as a model public health achievement.

The company also maintained a Laboratory of Industrial Hygiene that studied the effects upon the lungs of various inorganic dusts encountered in foundries, in asbestos-fabricating plants, and in hard-rock drilling and the extent of atmospheric pollution caused by specific poisonous substances such as lead, manganese, and carbon monoxide.

#### WATERBORNE DISEASES

Metropolitan also undertook a campaign against typhoid fever. A booklet entitled *Typhoid Fever and How to Prevent It* was distributed. Purification of community water supplies, improved sewerage systems, and milk pasteurization were encouraged. Preventive measures such as vaccination, cleanliness in food handling, and fly eradication were stressed in the drive to reduce mortality from typhoid fever.

#### FOOD AND OTHER POLLUTION; SANITATION

The company also co-operated in hundreds of city cleanup campaigns and supported bond issue referendums for the construction of sewer systems, the installation of food inspection, and the creation of health departments. Over five million copies of "A Day in the Life of a Fly" were distributed, and some other pamphlets published included "Hookworms," "All about Milk," "Get Rid of Rats," and "From Flies and Filth and Fever to Food." In 1915, 5.5 million flyswatters were distributed. The use of paper drinking cups instead of a common drinking cup was encouraged. Later on, fluoridation referendums were supported.

Thetford Mines, Quebec, was the scene of another test of the demonstration method. It is in the heart of an asbestos-producing region and was surrounded by huge open pits, cable derricks, and asbestos mills. Giant heaps of waste asbestos also abounded. The community had one

of the highest infant mortality rates in Canada—276 deaths per thousand live births between 1917 and 1920. The company set out to show how this rate might be reduced by educating the mothers in sanitation and nutrition. Before confinement, only about 10 per cent of the women went to see doctors, and the chief causes of death of the newborn were malnutrition and children's ailments. Most babies lived on cornstarch, boiled potatoes, and milk in their first few years and were treated with patent medicines and home remedies when disease struck.

Work began in Thetford in March, 1921. In the last full year of the demonstration, nurses made almost 15,000 home visits to mothers and their infants. More than 500 babies were under care in May 1923. The average infant mortality rate of 276 per thousand for 1917-20 dropped in 1921 to 196.6, in 1922 to 140.3, and in 1923 to a low of 96.4. The Thetford Mines demonstration focused the attention of French Canada upon infant welfare work. "The results which were obtained in Thetford are really wonderful," wrote the prime minister of Quebec. "The demonstration which you conducted was one of the things which led the Provincial government to make an appropriation of \$500,000, to establish a chain of clinics throughout the Province."

#### INDUSTRIAL HAZARDS

Since so many of its policyholders were industrial workers, the company organized the Industrial Service Bureau in 1916 and began to work with employers to solve health problems in their particular industries. The growth of group insurance gave great impetus to this work.

During the 1920's and 1930's, major emphasis was placed on industrial hazards. The studies undertaken for group policyholders covered such industries as mining (coal, metals, feldspar), railroads, pulp- and paper-making, dry cleaning, laundries, bakeries, garment shops, storage battery plants, hard-rock drilling, food manufacturing, iron, steel, and bronze foundries, asbestos manufacturing, street railways, textile mills, glass factories, newspaper plants, and rayon manufacturing. Scientific knowledge concerning occupational dust and poison hazards and plant sanitation was enriched as a result of these studies, and various industrial laboratory techniques were tested and developed.

In 1927 the company commenced a five-year study of silicosis and pulmonary dust diseases among miners working in the metal mines of Picher, Oklahoma, in co-operation with the United States Bureau of Mines and the Tri-State Zinc Mine Operators. The primary purpose was to reduce the incidence of silicosis and tuberculosis among miners and to safeguard their general health and that of their families.

Studies made at the Picher Clinic and the Saranac Laboratory showed that pre-existent pulmonary diseases, especially tuberculosis and pneumoconiosis, hastened and aggravated the development of silicosis. Dr. A. J. Lanza, of the Metropolitan, a pioneer in this field, observed that coal miners who presumably had anthracosis and who then went to work in hard-rock metal mines succumbed to silicosis much more readily than did their fellow workers. Evidence also tended to show that men with syphilis developed silicosis more quickly, and their disease ran a more rapid course.

The Picher Clinic was turned over to the mine operators in 1932. As a result of this work, miners with active tuberculosis were kept from underground employment, and applicants for employment who had signs of the disease were not hired for mining. The report on the Picher Clinic demonstrated how the production rate of new cases of silicosis came down as the amount of silica dust in the air decreased. The same was true at Butte, where the amount of silica in the ore was much less and the clinical picture was milder. Much work also was done with regard to asbestosis. Plants were cleaned up and dust concentrations were controlled.

Dr. William J. McConnell conducted many surveys and studies of industrial health, both for the company and as a volunteer member of agencies devoted to industrial health. During World War II he was largely responsible for reducing deaths among munitions workers from TNT poisoning almost to the vanishing point.

#### RECENT ACTIVITIES

As a result of increased environmental activism, consumerism, labor negotiations, and government regulations as well as more general awareness of pollution problems, Metropolitan Life is often called upon for advice and is frequently asked for detailed mortality studies by its group customers.

Much impetus to these requests resulted from passage of the Clear Air Act of 1970, the Water Pollution Control Act of 1972, the establishment of the Environmental Protection Agency, and particularly the enforcement of the Occupational Safety and Health Act of 1970. The administration set up by this act targeted for primary attention five industries with high injury frequency rates—longshoring, roofing and sheet metal, meat and meat products, mobile homes manufacturing, and lumber and wood products—as well as five health hazards— asbestos, lead, silica, cotton dust, and carbon monoxide. Leonard P. Woodcock, president of the United Auto Workers, has stated that “the use of thousands of new

chemical substances, the recognition of the toxic effects of fumes and gases from industrial processes, added to the age old hazards of noise, heat, and dust are major threats to health. Workers are being alerted not to ignore repeated headaches, dizziness, blurred vision, or skin rashes. These are first warnings of potential hazards to health in the work place.”

The following are examples of some inquiries placed before actuaries and statisticians at Metropolitan Life in the past few years:

1. A group customer requested data illustrating the relationship between cancer and exposure to gas and oil products as the matter came up in collective bargaining with the Oil, Chemical, and Atomic Workers Union. They also wanted statistics on excess death rates from heart disease among American business executives.
2. A large corporation required a detailed mortality study of individual plants for active, disabled, and early retired employees. Death rates were to be compared with those for the United States and the state or locality where the plant was located. There was special interest in the chronic respiratory diseases and cancer. Mortality differentials by occupation, industry group, educational attainment, and social class status were examined, using data from the United States and England and Wales. Comparisons were also made with the experience of standard ordinary insured risks and with group life insurance experience.
3. Mortality was studied at different plants of a large group customer. High accident mortality was found to be concentrated in certain plants. While cancer and chronic respiratory disease deaths were low in number and mortality was low overall, the highest death rates could be pinpointed to specific locations.

#### OTHER STUDIES

In his introduction, our chairman mentioned that in environmental pollution “multiple factors and complex relationships among them” are likely to be present and difficult to isolate among the factors involved. These factors include social class (as determined by occupation, education, or income), industry, geographic area, race, smoking and other habits, population distribution, meteorological data, sources of food and water, and natural background radiation levels.

When we turn to published papers in the environmental field, we also encounter the problem of analyzing cause-and-effect relationships and find the indiscriminate use of correlation techniques. Most of the studies use correlations based on simple linear regression, and the variables enumerated above are usually not considered. Measurement techniques often are crude, and there is also the difficulty of distinguishing between

lifetime exposure as distinct from current exposure to pollutants. Also, since persons are unlikely to die from increases in pollution levels unless they are already sick, morbidity rates should probably be given relatively more consideration as compared with mortality rates. However, morbidity rates are also affected by spurious factors such as seasonal variations and absences before or after weekends and holidays, and fewer morbidity data are available than mortality data.

Ernest J. Sternglass of the University of Pittsburgh has stated that "low level radiation from nuclear fission products in the environment such as are released by nuclear explosions and power reactors may already have produced serious effects on the health of the world's population far beyond those ever believed possible when our present radiation standards were originally formulated and adopted, especially for the case of the young infant." He reached his conclusions using least-squares trend lines fitted to mortality experience primarily of the years prior to the mid-1950's, when death rates were steadily declining. Mortality experienced in excess of that forecast by those trend lines was then correlated to radioactive emissions from power plants and atomic testing. He also related the rise and fall of radioactive emissions to the rise and fall of infant mortality rates in counties surrounding various nuclear reactors.

The striking reduction in death rates from the infectious diseases, brought about by the application of sulfa drugs and antibiotics, has diminished the part played by the infectious diseases in the total death rate and increased that for the chronic diseases (primarily the cardiovascular-renal diseases and malignant neoplasms) and accidents. Thus the long-term decline in mortality through the mid-1950's should not have been expected to continue into the future. This trend reversal has been noted in several other countries besides the United States. Morris H. DeGroot of Carnegie-Mellon University, who is similarly fitting regression lines to measure the effect of radioactive emissions on infant mortality, felt that the results were inconclusive and that "it is not possible to derive strong conclusions . . . from the simple regression models used."

Edward Lew, in a 1972 paper entitled "Who Is Dying and of What under Present Levels of Water Pollution," presented at the Sixth International Water Quality Symposium, concluded: "Present levels of water pollution in the United States appear with some rare exceptions (such as methyl mercury accumulations in fish), to have had little direct effect thus far on human health and virtually none on human mortality." For his paper the Statistical Bureau examined changes in life expectancy and mortality by age, race, and sex for the United States and western

Europe over the last fifty years. Waterborne diseases such as typhoid fever, dysentery, and gastroenteritis were selected for detailed study. The conclusions were at variance with the exaggerated claims of some environmentalists.

This does not mean that there is no danger from water pollution but that the effects on mortality are not yet readily apparent. The *New York Times* of May 13, 1973, headlined an article "Impure Tap Water a Growing Hazard to the Health of Millions across the U.S." It listed almost thirty drinking water systems that the Environmental Protection Agency had declared ineligible "to supply interstate carriers because of questionable water purity, plant facilities or operating procedures."

The *New York Times* reported that, in the decade 1961-70, 46,000 illnesses, 20 deaths, and 130 waterborne disease episodes were officially recorded in the United States from gastroenteritis, hepatitis, and typhoid. The problem has been exacerbated by the rapid population growth of urban areas, the lack of trained personnel, small drinking water system appropriations, and optional rather than mandatory health standards.

Viruses resistant to routine chlorination exist in many treated drinking water systems, and some of the 12,000 toxic chemicals used in industry are finding their way into water sources. Current federal drinking water standards take no cognizance of the viruses and do not deal directly with the chemical problem.

Our chairman quoted Jerzy Neyman of the University of California in Berkeley as suggesting that a comprehensive study of the health effects of pollution ought to be based on investigations of carefully selected communities, where detailed health statistics are available, by teams of experts over a number of years. This suggestion is really a return to the model health demonstration as described earlier at Framingham, Thetford Mines, and Picher.

#### CONCLUSIONS

In conclusion, it is expected that actuaries will have to devote more time and effort to pollution-related problems in the course of their daily activities both as individuals and as responsible corporate leaders.

MR. LOUIS WEINSTEIN: I would like to discuss the contributions which could be made in the future, particularly from the vantage point of the consulting actuary. It is my opinion that, if actuaries become involved in the area of matters affecting our environment, it will be consulting actuaries who participate to the greatest extent.

Why the consulting actuary? It is the normal practice of the consultant to take on engagements rather than to perform functions. New involvements fit into his work style. Actuarial consultants have been retained to give independent expert opinion in lawsuits, involving wrongful death cases in which life expectancy estimates were required. Other examples of actuarial services, outside the conventional calculations of gross premiums and cash values, suggest that activity in this field is a small logical step—and a step in the right direction.

Consultants are organized in groups ranging from single practitioners to international firms. We are in the business of selling hours of professional service for a fee. Although engagements in this area would tend to be bigger and the fees larger, no logical restructuring is required.

Insurance companies have other problems. They have regulation problems, charter problems, legal problems, and accounting problems. The question of independence should be academic, since none of us works for the kind of organization that would be seeking help, but I think that the tradition of seeking “independent” advice will get the consultants further involved. Also, the public may not accept the opinion of a group actuary if a party to the dispute is a customer of his employer.

I should state that I believe all consultants will have opportunities; but, as a consultant employed by an accounting firm, I believe that we will have a special advantage because our firms are better known outside the actuarial fraternity.

What are we going to do? We are going to use our mathematical expertise to make studies, evaluations, and recommendations. Corporations who are accused by groups of concerned citizens of pollution are going to retain us in order to substitute facts for impressions and demonstrations for appearances. We are going to be asked to perform studies in which an attempt is made to match economic pluses and pollution minuses.

We are going to make mortality and morbidity studies when drug manufacturers seek outside experts to determine possible ill effects of the products they make. We are going to examine projections to verify that they are accurate and reasonable. In general, we are going to attempt to help solve practical problems when requested to do so by public agencies and groups of citizens.

There are some special problems which could prove troublesome. Consider one actuarial problem which arises in our current business climate—generally favorable mortality and spiraling expense margins. In such a climate, a company might wish to increase its nonmedical limits

if it could be persuaded that the expense saving exceeded the additional mortality cost.

Contrast this problem to a situation where an industrial expansion is proposed which would add greatly to the economy of a particular area. Unfortunately, a certain degree of pollution would result. Under expert analysis, one could report one's findings and even venture a conclusion that the proposal was justified. But what if the pollution will hamper the recreational activities of groups of people who derive no benefit from the industrial expansion? There has been no trade-off; one group has benefited at the expense of the other.

Also, in the area of problems, I would like to discuss a topic of "assumption interplay." It has been discussed before, but I think it can be particularly troublesome in this area. In order to predict the result of a series of assumed events, a computer program is written—I've written a few myself—and the results spew forth. Often they are startling and upsetting. The problem is that often we miss certain intermediate results which, if seen, would demonstrate not that a calamity will occur but that it could not occur, since these intermediate results are intolerable and the assumed results could not be allowed to happen.

I was pleased to hear some comment on the "quality of life." Pollution is a problem when it causes people to be miserable as well as when it adversely affects mortality and morbidity. This problem is particularly acute in large cities where money is scarce and the need for recreational facilities is great, particularly for those who have dull jobs or the dullest job of all, which is no job. I really question whether the New York urban crisis would be as critical if it were possible for large numbers of families to swim in the rivers which surround us. The fact that we cannot swim in our rivers is a real social horror story.

DR. NEWTON L. BOWERS, JR.: I am a member of one of the Society's new committees, which has the title "Committee to Co-operate with Governmental Demographic and Statistical Agencies." This committee was organized in 1971, apparently to give the Society a means of reacting to requests from governmental agencies for assistance. Although the chairman, Walter Shur, assured me that to serve as a member of the committee required very infrequent duties, we were immediately asked to prepare a response to such a request. I will describe the project and our committee's role because it seems a reasonable model of what can be done.

In January, 1972, the Committee to Evaluate the National Center for

Health Statistics, through a staff member, met with a group of actuaries in New York and invited the Society to comment on the mission of the NCHS. The NCHS gathers a large number of statistics which can be useful in studies on topics under discussion here today, particularly in the area of the effects of pollution on mortality and morbidity. I know that the HIAA was also approached on this matter, as were, I presume, other professional and learned societies. The Evaluation Committee indicated that it was "anxious to have the benefit of your Society's viewpoint or more specifically its suggestions for changes, additions or the maintenance of status quo for the NCHS mission." This required the completion within three months of a very extensive and detailed questionnaire covering nine topical areas: natality and family statistics, utilization of health services, characteristics of health facilities, health manpower statistics, costs of medical care, environment, and looking ahead to particular future needs.

Our committee solicited answers to the questionnaire from several actuaries known to be knowledgeable in this field and from the members of the six Society committees concerned with mortality and morbidity experience studies. I was assigned the job of soliciting comments from those actuaries in the academic area who were knowledgeable and interested in this subject.

We received excellent co-operation from these committees and their chairman. Our committee edited and combined the replies we received and prepared a consolidated response to the Evaluation Committee, which was mailed to them on March 31, 1972.

It was clearly indicated that our reply was to be considered a compilation of responses from individual actuaries and not an official statement of the Society of Actuaries.

As a result of our efforts, we were invited by the NCHS to name a representative of the Society of Actuaries to serve on the NCHS Panel of Advisers. After consulting with Robert J. Myers, we recommended Mr. Frederic Seltzer, who supervises the Statistical Bureau at Metropolitan Life.

Several things stand out in this example:

1. The governmental agency came to us for help. They recognized the expertise and interest of the Society, and they wanted the benefit of the Society's views of the NCHS program. They had a series of questions to be answered and set the ground rules for the format of our response.
2. This was not a research project but merely a matter of communication—that is, communicating the Society's expertise, knowledge, and suggestions as to changes in the NCHS program which would be helpful to actuaries.

3. The Society did not state an official position, nor was the response to be considered an official position of any committee.

The three most prevalent comments in our response had to do with timeliness, geographic detail, and the need for more cells for the data with related measures of exposure. It is also interesting to note that the four questions concerning environmental pollution elicited no comment from the limited sample of Society members we contacted.

Since then we have been involved in only one project. The Society received a letter from Harold Passer, assistant secretary for economic affairs in the Department of Commerce, informing the Society that the department is considering the advisability of developing a major electronic statistical information access system, SUMSTAT. It was requested that members of the Society be present at some of the public meetings held by the Department of Commerce to explore various aspects of their proposed system. Our committee arranged for one or more members of the Society to be present at meetings in Boston, New York, and Philadelphia. In addition Walter Shur's name was given to the Department of Commerce as the person to receive any future materials related to the SUMSTAT project.

This general subject of mortality and health statistics is one of great current interest, especially in studies of the effects of pollution on health. The conditions involved—such as birth defects, infant death, and any of numerous severe chronic diseases—generally affect relatively few persons. The estimation of the incidence and prevalence of rare health conditions is a difficult statistical problem. I will attempt to outline briefly how such studies are performed.

Birth and death statistics are a by-product of the birth and death registration systems. There is no problem in estimating the number of rare vital events in terms of medical or demographic variables if these variables are part of the record. Unhappily, these records are used primarily for legal purposes, and the data are concerned with facts related to the date of the event. Studies involving more detailed histories cannot be made so easily.

Sample survey techniques are used to augment national vital statistics. Surveys can be linked to the vital records. These records constitute a good frame for the sampling, since they are nearly complete, contain useful information to help design the sample, and provide sources for further information, such as the relatives, doctors, and hospitals concerned. The surveys are typically performed by mail, with follow-up

personal interviews for a subsample of nonrespondents. One such study related infant deaths to levels of radioactivity.

In studies where occurrence rates are desired, some estimate of exposure is also required. This is found typically by using a second survey, either linked as above with vital records or, more often, linked with a household sample survey. One example of a study which involved a dual sample survey was an examination of infant death rates by socioeconomic class. In this study the exposure was based on a survey linked to birth records. Another study which used exposure based on a national household survey was an examination of the relationship between death rates, smoking history, and residence.

In attempting to estimate the incidence and frequency of rare health events, we have less satisfactory basic data. The stress on rare events is appropriate because we are interested in discovering relationships between, for instance, pollution problems and health problems while the events are still rare. The National Health Survey is a collection of sample surveys which produce different health and related population statistics. One is the Health Interview Survey, which examines the dimensions of illness and the impact of morbidity in approximately 35,000 households per year. A second such survey is the Hospital Discharge Survey, based on 200,000 hospital discharges per year (one-half of 1 per cent of the total), where the data are abstracted from hospital records. The sample size for both of these surveys is rather small for studies of rare health events.

A method of obtaining better information on rare diseases has been developed. An example was a study of cystic fibrosis. This study was performed by sampling medical sources, that is, doctors and hospitals, and having them report all the cases they treated. The sample was stratified on the basis of hospital size and physician's specialty. The sources then reported all other hospitals or doctors known to have treated the same case, and an effort was made to track down still further sources that had treated that case. This enabled the researchers to estimate the average number of sources per case and thus indirectly to estimate the number of cases to be found from the nonsampled sources. These techniques are the subject of a highly interesting paper by Monroe Sirken given at the Sixth Berkeley Symposium in 1970.

Some of the other relationships examined by these ad hoc studies involving mainly vital records and surveys were (1) occupation versus cancer; (2) air pollution versus bronchitis, total respiratory disease, lung cancer, other cancers, cardiovascular disease, and infant mortality; (3)

mineral content in water versus cardiovascular disease; and (4) water pollution versus hepatitis and infant mortality.

There are several problems with studies of this type. First, there is concern about accuracy of the recorded cause of death. Also there are other important variables that may not have been considered in the study. These include smoking habits of the decedent; occupation, including additional exposure to pollution; family history; and income and social status. The implicit assumption underlying the omission of such variables is that these variables are either constant across the different groups in the study or that these factors vary randomly with tested variables like pollution.

These studies typically involved a detailed search for significant correlations between the health problem and the environmental factor. Correlation is a measure of association—the two factors are found to vary in some consistent way. It is not by itself evidence of any cause-and-effect relationship. The investigator in such a study usually rests his case by concluding that the association is so strong that it is unlikely that the omitted variables could have given rise to the observed correlations.

Another kind of study which has been made attempts to relate short-term mortality or morbidity rates to observed short-term levels of pollution. Mortality studies of this type are questionable, since typically it is the already seriously ill who would experience extra mortality during a period of high pollution levels. The deaths which such a study might assign to pollution should be assigned more accurately to the illness which may have no relation to pollution. Morbidity studies appear to be of more interest. Consider, however, a study of absenteeism from work versus levels of air pollution. There is a weekly pattern of absenteeism (higher on Mondays and Fridays) which is not particularly health-related. This pattern would show correlations with weekly patterns of air pollution caused by industrial activity and automobile and truck traffic. It would be erroneous to infer any cause-and-effect relationship from such observations. Further, taking larger samples would not remove these observed correlations.

Where does that leave the Society and individual actuaries as far as contributions to the national discussion of pollution and population are concerned? We have had a long-term interest in mortality statistics and causes of death. There have been examples where our statistics have suggested unexpected relationships between observables (like blood pressure) and mortality rates. This is an area of genuine expertise of actuaries. I am not so sure that this expertise extends to various statistical

techniques used, such as multiple regression and correlation and time series analysis. Clearly some actuaries are highly skilled in these areas. These particular individuals should be encouraged to bring their skills to bear on these problems. I have suggested above that this subject is full of pitfalls, so I am doubtful of the wisdom of a major effort here by the Society. However, the Society should attempt to stimulate such individual research.

One method might be a call for papers in this area by the Committee on Papers. At least there should be an indication that well-researched, well-written papers in this area would be considered for publication in the *Transactions*. Of course, the author of such a paper would have the same data problems that other investigators have had in this area. Would the variables of interest in the study, such as residence history, socio-economic class, smoking habits, and so on, be any more available to a person using insurance company or intercompany mortality data?

There are several activities of the Research Committee that touch on the general subject of our discussion. This fall there will be a research conference at Harvard on "Demographic Projections and Related Actuarial Topics." Second, during the annual meeting in New York a panel discussion is scheduled on the general subject of actuarial research: What is it? How do you do it? What should the Society do to stimulate and direct it?

This concludes my discussion of several of the Society committees whose activities relate to the general problem discussed. I think that this is an area in which the Society should proceed with some care, while at the same time encouraging its members to participate in research projects and publish their findings.

**MR. ROBERT H. HOSKINS:** At the John Hancock, a Committee on Environmental Policy was established by executive order on March 12, 1971, to evaluate the effects on the company of developments in the field of ecology and environmental control and to recommend responsive, appropriate company policy and action. The committee submitted its report on December 21, 1971.

The report proceeded on the premise that policy and action were appropriate only when consistent with the company's functions in society—primarily as an insurer of lives and health and also as an investor and corporate citizen. The committee analyzed the company's environmental role in terms of these functions.

Three subcommittees were organized, to consider the company as in-

surer, investor, and corporate citizen; in addition, a resource group was appointed to assist the subcommittees. Another member of the Society, William L. O'Connor, and I were members of the insurer subcommittee.

One of the first things we did was to write to actuaries in twenty-three other companies, asking what they might be doing in the environmental field; all but two responded. Probably the most extensive answer came from Edward Lew; on the whole, however, it appeared at that time at least that little was being done in the companies which we surveyed.

The final report contained three parts with two appendixes, as follows:

- I. The Environment: Developments (review of developments in the field of ecology and environmental control).
- II. The Company: Basic Policy (evaluation of the effects of developments on the company and recommendations on basic company policy).
- III. The Company's Operations: Specific Policy and Action (recommendations on specific policy and action in several areas of the company's operations, including investments, insurance, and administration).

Appendix A (Supplement to Part III): Initial Guidelines and Methodology for Investment Operations.

Appendix B (Supplement to Part I): Supporting Information.

Some of the recommendations in the report admittedly would increase operating costs, depending upon the level of implementation; a few could appropriately be made subject to cost-benefit analysis under existing company procedures prior to implementation by the department or committee concerned.

The report was received by the company's Executive Committee, the basic company policy was approved and adopted as company policy applicable to all departments, and the recommendations were referred to departments or committees for implementation or consideration, with periodic reports on action taken to be made to the Executive Committee.



## HEALTH MAINTENANCE ORGANIZATIONS

1. Organizational structure: three examples:
  - a) Med-Center Health Plan (St. Louis Park, Minnesota)
  - b) North Central Health Plan
  - c) Sacramento Medical Care Foundation
2. Roles of physicians and insurers
3. Description of the actuarial function
4. Analysis of marketing and risk problem

### *St. Paul Regional Meeting*

CHAIRMAN WILLIAM A. HALVORSON: As the cries for relief from the pressures of the high cost of medical care reached a thundering din, the Department of Health, Education, and Welfare started a campaign for the "restructuring of our health care delivery system." This campaign is now more than three years old. A new phrase was invented to describe the vehicle of this restructuring, called the "health maintenance organization" (HMO)—a marvelous euphemism, especially since no one has defined it yet everyone talks about it.

How is the restructuring coming along? We have heard much discussion and have seen only a modest amount of action. Practical problems of building new facilities, recruiting medical staff, and gaining enrollment have been clearly defined as impediments to starting new clinics.

Some of us have felt that the health care delivery system could be restructured on a broad scale only if a way could be found to permit the fee-for-service physicians to participate in HMO's.

DR. HARLEY RACER, M.D.:\* Two years ago this spring, the St. Louis Park Medical Center set into motion planning for what has become the Med-Center Health Plan. This was an experience born out of planning with physicians in a large and well-known existing group practice.

The St. Louis Park Medical Center's 70-plus physician group was organized over twenty years ago, bringing quality health care together with a dedication to continuing professional development, and with a service commitment for a large suburban population. The center has most of the major medical specialties, available in modern facilities in a

\* Dr. Racer, not a member of the Society, is a physician with the St. Louis Park Medical Center.

large suburb west of Minneapolis. A satellite program has been developed recently to provide primary care within new growing population centers spreading westward.

The development of prepaid and comprehensive health care for a large number of patients within the environment of a successful fee-for-service practice offered the means of testing a "new" delivery system and a unique opportunity for critical evaluation in comparison with the "old." The potential advantages seem to be chiefly the minimization of expensive administrative services such as billing, insurance form processing, and the like; the ability to recruit and hire physicians on the basis of the anticipated need of an identifiable group of patients; and the budgeting for health programs for the group of patients on the basis of their past medical experience and their health needs in terms of education, socioeconomic factors, and health care goals.

The trustees of the St. Louis Park Medical Center then commissioned the research and development committee to make a feasibility study for such a program. First, it was necessary to educate the committee and the staff physicians. Over the following year they had the opportunity to listen to and review the experience of others involved in prepayment across the country. (At the same time, there was the beginning of national interest in what has subsequently become the HMO strategy). A number of large insurance companies heavily involved in the health care industry were interested in discussing the potential development of comprehensive health care with a prepayment mechanism with large groups like our own. The Institute of Interdisciplinary Studies provided the clinic with the opportunity of using their consulting staff and resources, which helped us to organize our developmental period.

The board of trustees of the St. Louis Park Medical Center then created a comprehensive health planning committee for the sole purpose of planning and implementing over the following months. Parts of the project were identified, and the organizational structure of the program began to take form. A nonprofit corporate entity was filed with the state. The corporation then entertained bids from groups able to provide programs that were not in our fee-for-service system—marketing, actuarial, insurance, and administrative systems.

In the last year the St. Louis Park Medical Center and Northwestern National Life Insurance Company studied and developed each of these areas. With combined efforts over a large number of morning, noon, and evening meetings, they resolved each of the developmental tasks, allowing us to put the plan on the market in November, 1972.

The problems that were identified along the way included the nonprofit

issue. Our initial approach was along the lines of a profit organization. However, it became apparent that, in the absence of enabling legislation, attempting to start a medical care delivery capability for profit would be overwhelming, time-consuming, and complicated by the probability of litigation and legislative change. Having decided to take the nonprofit route, we then had to obtain the opinions of both the attorney general and the insurance commissioner as to what part, if any, of this was insurance and should be identified as such.

Working with Northwestern National Life, we were able to provide the insurance commissioner with our proposals and problems. We were able to depend heavily on his recommendations regarding the plan's relationship with multiple provider units. The service components paying the various provider units related to these services on a capitation basis. Leaving the nonservice units identifiable as insurance, we were able to file these policies with the commissioner and move toward the implementation of the program with confidence that both the insurance commissioner and the attorney general were aware of our plan and were comfortable with its organizational mechanism.

The medical society in this state is concerned, as are those in many other states, about the corporate practice of medicine, free choice of physician, and the potential of physician advertising of services. We presented the program to the executive committee of the county society and in an interesting discussion were able to obtain their endorsement.

Legislation related to HMO's both nationally and locally has been a continuing, imponderable concern. Just in the last week, our state house of representatives passed a legislative act which may require modification of our organizational structure.

Various provider components—for example, hospital, ambulatory services, neurology and psychiatric services, pharmacy, and so on—also required concentrated effort. Hospital relationships were difficult to develop because of the educational process necessary to convince the hospital administrative arm that the plan would not significantly decrease their patient bed utilization.

Part of the program's development was the very necessary and in-depth involvement of the insurance company's resources. In those areas where the physician has little or no experience or training, we depended on the actuarial capabilities of the insurance company. We relied on the insurance company for marketing strategy. Benefit package development was also a cumbersome job. It needed to be modified from typical insurance language in order to develop a simple yet comprehensive

description of services that can be easily understood and administered efficiently.

In summary, Med-Center Health Plan developed because of mutual enthusiasm, interest, trust, and credibility of the two organizations involved. The foundation was the existing structure of a thriving physician group already delivering high-quality health care within the community. In those developmental areas where physician groups have little knowledge and experience, the insurance company's resources were critical in the final packaging and polishing of the program itself.

**MR. LLOYD F. MATHWICK:**\* This is a review of some of the organizational problems, successes, and mistakes in connection with setting up health plans in Wausau, Green Bay, and Milwaukee. It was determined quite early that uniformity of coverage was an important advantage in promoting the plan. This eased the problems of marketing, particularly if more than one insurance carrier was involved, and delighted the physicians and hospitals, who are often critical about all the variations in insurance plans providing coverage for their patients. They are often obliged to interpret coverage to determine where benefits are payable, so uniformity is a considerable advantage. Advertising and general promotion are also simplified, as is comprehension on the part of enrollees and employers. Such uniformity was particularly essential because similar names were used in each area with the area name prefixed—Milwaukee Health Protection Plan, Green Bay Health Protection Plan, and so on.

The plan began in Wausau on January 1, 1972, with 3,400 enrollees. The first year produced a surplus due primarily to the reduced hospital utilization. For the second year, it is expected that the enrollment will increase to 10,000. All physicians in the county medical society are participating.

The Green Bay plan became effective on January 1, 1973, with 55 out of 140 physicians participating. At the moment, about 1,000 people are enrolled, and by year end it is expected that this will have been increased to several thousand.

In Milwaukee it is expected that the plan will become effective on July 1, 1973. As of today, 396 physicians have agreed to participate, and it is expected that 500 will have enrolled by July 1. There is hope that a minimum of 25,000 enrollees will be in the plan by the end of the first

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year. Several other carriers have indicated interest in marketing this program in Milwaukee. Although Blue Cross and Blue Shield have announced their intention of setting up a similar program in Milwaukee, at the moment they have not indicated an effective date.

In the organization of a plan, we found that it was quite important to select a city where we have an existing large volume of group health insurance business and where the medical community has a minimum number of problems. While it is useful to have sponsorship of the medical society, this is not essential as long as this organization is not resisting the effort.

In all communities where discussions are occurring, we found that the physicians generally had a desire to experiment possibly to help offset the need for federal involvement in a compulsory arrangement. Additionally, in a few communities there was concern about the spread of traditional HMO-group prepaid practice plans, and they felt that our type of plan might have the potential of producing satisfactory results without overturning the habits and procedures of the medical community.

Many questions were asked concerning the motives of the insurance company in promoting this program. We indicated frankly that, in our mind, it was a question of survival in the health insurance business. We had no wish to attempt to dictate health care, and our facilities were primarily for the use of the providers in a manner which was most useful to the entire system.

The initial contact with a community usually came from some physicians in the area. If this contact was not received from the president of the medical society, discussion with that person was immediately held. If interest existed, a meeting with the board of directors of the society was a normal second step. If interest continued to exist, a total society meeting was held. The attendance at such a meeting might represent only one-third to one-half of the physician population, but the physicians generally felt that this was good for such a subject. Following such a meeting, the society set up a study committee to learn all the details and to become very familiar with the specifics of the concept and program, including the fees, so that they would be in a position to discuss it with their colleagues.

About this time, a tentative effective date of such a plan was also set. This usually was eight to ten months in the future. Also, if possible, some indication of this activity was provided the local press, so that employer customers could become somewhat familiar with the effort.

The study committee of the medical society met on a monthly or

semimonthly basis. This was the nucleus of the physician control of the program. This group determined what fee schedules would be appropriate and what variations from the schedule would be acceptable for a particular physician. They also set up the peer review mechanism and provided general liaison with the medical society. In selecting the study committee, it is important that all specialties, hospitals, and geographical areas be properly represented.

Communication with the medical community is extremely important. It is difficult to have good representation at the various physician meetings, so many will depend completely on written communication for information concerning the plan. When discussions first begin in a community, we send out monthly newsletters to all physicians. These newsletters include a question-and-answer section which deals with the problems arising most frequently, a progress report, the time and place of future meetings, the effective date of the program, a list of meetings and discussions previously held, and the total number of physicians contacted, as well as a phone number which can be used if a physician wishes to receive clarification on any points.

Through the communication, we attempt to build the activity to a climax which will occur two or three months before the effective date. This climax is the point at which physicians are asked to participate in the program by signing individual agreements. This approach appeared to us to be important, since many physicians have the impression that setting up an HMO involves one or two years and that they need not concern themselves too much about what is going on until the end of that period. It was found that it was important to dispel this notion quickly, and that is the reason for setting an effective date reasonably early.

About the time discussions begin with the physicians, it is necessary that hospital administrators in the area also be contacted. Their general reaction will probably be that they would be interested in participating in the program if a sufficient number of their staff physicians participated. Therefore, there may be a lull in discussion activity with the hospitals between the initial contact and resumption of meetings which would probably coincide with the physician enrollment period.

During the enrollment process, it is important that several physician meetings be scheduled on at least a weekly basis and announced to all physicians well in advance. Their interest in attending such meetings increases considerably once the enrollment begins. Their schedule, of course, requires advance planning, and they appreciate the opportunity to select a time and place from several alternatives.

It was found that explaining the plan, concept, fees, motives, and goals made very little impression on the physician until the second or third contact. Therefore, at each of the meetings, we review all these basics. Near the end of the enrollment periods, it was found that many physicians had been attending as many as five and six of these meetings in their desire to learn all the details. Upon inquiry, they indicated this was not a waste of time from their standpoint, in that much new information was picked up at each subsequent meeting.

During the enrollment of physicians, the most effective incentive for participation seemed to be the fact that a list of participating physicians would be shown to each employee at the employee enrollment canvass. These employees would then determine whether their family physician was on the list and, if he was, very likely would enroll. If not, then they would have to decide whether to change physicians or refuse to join the plan. Physicians quickly recognize the attractiveness of the program from a consumer standpoint, and, if they have any concern about losing patients, they are inclined to "try it for a year."

The ongoing administration of the program is important to the providers. They want to be sure that it is simple, so that no additional administrative load will be added to their staff. They also want it to be prompt and accurate.

Visiting nurses associations, extended care facilities, and nursing homes must also be contacted, since they do play some role in the program. When it appears that sufficient physician enrollment will be obtained, a meeting of the members of the business community is scheduled to announce the whole program to them and, through the press, to the general public.

**CHAIRMAN HALVORSON:** The Medical Care Foundation of Sacramento has formed a Foundation Community Health Plan to offer prepaid health care to groups in a five-county area. The FCHP is directed by a board made up of physicians, hospital administrators, pharmacists, and lay personnel.

Participation in the prepaid plan is voluntary on the part of the providers. Currently, 987 physicians and 21 hospitals are participating—essentially all the hospitals in the area and 90 per cent of the fee-for-service physicians in the area.

Since July, 1972, the plan has been enrolling cash-grant recipients under MediCal (California version of Medicaid) under a contract with the state of California. Enrollment has been voluntary, but currently over

35,000 people are covered under this contract. The state pays the FCHP predetermined per capita rates for each aid category enrollee. The FCHP providers bear the risk that subscription income will not exceed the value of services rendered. Participating providers agree to accept a risk deduction of between 5 and 10 per cent of usual fees to provide a risk pool for absorbing any losses. A professional reinsurer was sought to cover the risk in excess of the risk pool reserve on the state contract, but none was willing to underwrite the risk.

For employer-employee groups in the area, the FCHP will offer a prepaid plan option through professional health care underwriters. The FCHP will receive its predetermined per capita rates, which will depend upon age, sex, and family characteristics of the enrollees. The carrier will add its own margin to these rates to cover its marketing cost and to reinsure the FCHP. The risk, in the case of smaller employer-employee groups, will be layered as follows:

1. The FCHP will use its risk pool on these specific classes of plans.
2. The carrier will absorb additional losses up to 10 per cent of the earned subscription rates on such plans.
3. The FCHP will again absorb any excess losses, either directly out of contingency funds or through another professional reinsurer.

In the way of controlling the cost and quality of health care services delivered, the FCHP provides for close peer review. Its management information system provides for a unit patient record, physician and provider profiles, and patient profiles. Utilization and charge levels are under supervision and control, and these activities have strong support from the providers.

The foundation is starting a new medical facility in a medically underserved community and will recruit the medical staff.

In sum, the foundation believes that the plan is an HMO in its purest form, in that it has developed an integrated health care delivery system, it is providing access to all citizens by using existing and new facilities, there is strong physician incentive and involvement, and the plan attempts to keep people healthy by providing preventive care. (So far the organization is also nonprofit.)

MR. JOHN G. TURNER: There have been a number of recent articles dealing with methods and approaches to developing capitation rates for HMO's. This subject might be considered the classical area of actuarial input into HMO operations and development. I would like to depart from a discussion of this classical activity and discuss some other ways in which actuaries may well find themselves obliged to deal with HMO's.

Basic to the reason for our interest in HMO's is the cost of health care in general in the United States. An actuary dealing with health insurance to an increasing extent must look at the broad picture of total health care expenditures and the hospital and medical entrepreneurs and institutions which are the recipients of these expenditures. As has been pointed out, one of the basic reasons why many of us are interested in the development of the HMO mode of health care delivery is the potential that this mode has for reforming or improving the efficiency of the general health care delivery system.

There are two basic elements of health care delivery with which we concern ourselves: quality and cost. I am not familiar with anyone who has developed a method of effectively evaluating quality of health care. The other aspect, cost, is one with which actuaries find themselves at home.

Many hours have been spent determining ways of measuring the most efficient method of health care delivery. One of the major problems is that of finding a basis that can be used to make a valid comparison between the cost of HMO-type health care and the cost of health care under the existing fee-for-service system. The article in the April, 1973, *Fortune* magazine dealt with this topic. It is my hope that actuaries will find ways to make substantial contributions to research in this area before too much time has passed.

Another phase of actuarial activities is the collection and analysis of data dealing with results of HMO health care delivery. The number of HMO's in which insurance companies are involved is expanding rapidly. Hopefully this expansion will result in the sharing of generous amounts of valid utilization and cost data relative to experience under the HMO mode. Actuaries should address themselves to the problems of measuring, analyzing, and reporting the data which are available for new and concurrent HMO developments. The potential rapid expansion of HMO's makes it desirable to share such data, with attendant recognition of its validity (or lack thereof).

As an initial step in this process, I would like to describe some of the experience we have observed during the first five months of the operations of Med-Center Health Plan in St. Louis Park, Minnesota, an HMO in which my company is involved.

1. Our original assumptions provided for roughly 540 inpatient days per thousand per year. Thus far we have averaged about 400.
2. The area in which our early experience has been the most adverse is that of prescription services. The frequency of prescriptions has been consistent with expectations; however, it appears that most have included 60- or 90-day supply, compared with the 30-day-supply assumed in the capitation.

3. The physician capitation thus far has proved to be less than the equivalent fee-for-service charges for services actually provided to plan subscribers. Some deficiency was anticipated in this area. By the end of the first year of operations, we expect the equivalent fee-for-service charges to be about 110 per cent of the capitation for physician services.

The utilization assumptions underlying these data were as follows:

*Hospital:* 1967–69 group hospital experience less about 15 per cent, the credit varying by age of subscriber.

*Physicians:* Rates of physician and clinic encounters varied by age, but the average annual physician encounter rate implicit in the capitation is about 5.2.

*Drugs:* The average number of prescriptions varied by age, but implicit in the capitation is about 3.7 prescriptions per year for adults and 0.9 for children.

We have experience in stop-loss and emergency care coverages, but it is too early to discuss the results.

A third area requiring the involvement of actuaries is the assessment and evaluation of special types of risks which are unique to the HMO mode of health care delivery. Among these are the following:

1. Most HMO's require some form of stop-loss coverage to protect the sponsoring organization or provider group from a substantial financial loss resulting from a catastrophic occurrence. This is an area in which there is virtually no experience, and all claim costs and rates are hypothetical. I anticipate that, before long, simulations of HMO operations will be developed which will enable us to develop reasonably valid theoretical claim costs for such stop-loss coverages.
2. There is usually a request for or an interest in some type of stop-loss coverage on an individual subscriber basis. This would involve, for instance, an insurer's covering the aggregate value in excess of \$3,000, \$5,000, or \$10,000 of health care services received by any one subscriber in one year. This has elements of the high-deductible major medical type of which we have been hearing so much lately. However, the medical services covered are provided in a different environment from that of the fee-for-service coverage under the typical high-deductible major medical policy. This involves some different considerations with respect to the development of claim costs.
3. There are other miscellaneous types of coverage. An example would be out-of-area or emergency care at nonplan facilities. These require special attention and data which are not generally available.

The HMO bill recently passed in Minnesota allows HMO's to purchase insurance for (a) 100 per cent of the aggregate value of services in excess of \$5,000 for one subscriber; (b) costs of care received by subscribers in emergency situations at nonplan facilities; and (c) 95 per cent of the aggregate value of services to all subscribers in excess of 105 per cent of

capitation revenue. I understand that there is a similar provision in one of the federal HMO bills.

An additional area which is unique in the HMO environment concerns the arrangements under which an original provider, Provider A, will negotiate a subcontract with a second provider, Provider B, for Provider B to render to plan subscribers certain comprehensive health services in return for a predetermined prepaid fixed fee per subscriber. This has occurred in my own experience with respect to psychiatric, neurological, and anesthesiological services. In this type of negotiation the actuary's estimate of the appropriate capitation rate is given a great deal of credence—possibly more credence than it deserves. It is important that a careful analysis be made of the cost of the services to be provided, and an attempt must be made, on an objective basis, to develop a capitation rate from the point of view of each of the adversary providers. In one case a group of psychiatrists negotiated to provide all the inpatient and outpatient mental services for a fixed prepayment sum from the sponsoring provider group, and in turn the psychiatrists took sub-subcontract bids from several inpatient facilities to provide the psychiatric inpatient services under this contract on a prepaid basis. I suspected initially that this was an indication that the inpatient portion of the initial psychiatric capitation negotiated may have been redundant.

The final, and certainly not the least important, area of HMO development and operations in which actuaries can provide an expertise not generally available is in the area of management control. In my opinion one of the major advantages of the HMO mode of health care delivery is that the concept involves inherently an organized delivery system wherein, under the assumption of sound management control, resources are allocated and consumed on an optimal basis. If an HMO does not conform to this principle, then it cannot compete with the existing fee-for-service system. The HMO concept itself assumes management control. Actuaries have the ability to identify and quantify the results of management decisions. The basic element of this process is the projection of HMO operations, both in the sense of the costs of health care utilized by the subscriber group and in the sense of internal financial operations. Using these results, HMO management can strive to achieve new objectives. The fruit of this effort will be an improvement in health care delivery.

It is possible to go on describing the great number of other ways in which the actuary, using his credo "... to substitute facts for appearances ..." can contribute to the development of HMO's. In a broader

sense, however, I view this involvement as a contribution toward the improvement of the health care delivery system in total—and I commend this to you as a most fascinating and worthwhile experience.

MR. KENNETH E. KAYSEN:\* The development of diagnostic profiles and treatment profiles could be one of the greatest contributions to modern medical care. The structure and method of operation of a true HMO will greatly facilitate the gathering of such information. I am concerned about the collection of diagnostic and treatment data. Because each separate HMO recognizes the importance of collecting data, each is spending considerable time and energy to establish its own method and format of collecting such data. When the time comes to pool these data on a national scale, it will be either extremely expensive or even impossible because of the multiplicity of the systems; thus we will have made a “big mistake.” I feel very strongly that now is the opportune time for effort and money to be spent in the development of a general format for the collection of such data.

*San Francisco Regional Meeting*

MR. ROBERT L. PAWELKO: At the present time there are three basic means by which HMO's can develop in the state of Illinois. The first is through what is known as the Voluntary Health Services Plan Act. This is a not-for-profit corporation act structured in a manner very similar to the Blue Cross/Blue Shield statutes. In fact, one of the Blue Cross plans operative in the state of Illinois is chartered under this act. The act, when implemented, did not contemplate the HMO concept, but it can be interpreted to allow an HMO to develop. Under this act a net worth of \$100,000 is currently required for formation. To date, this has been the primary vehicle utilized in the state of Illinois.

A second alternative would be to form a corporation under the Secretary of State's Office—presumably to provide physicians and hospital services—and then have this corporation enter into an insurance contract with an insurance carrier. The insurance carrier then is liable for all insurance benefits, while the HMO or the corporation itself handles the delivery of the service benefits. This method has proved quite difficult to operate with because of the various restrictions inherent in the insurance code—chiropractor coverage and other mandated coverages which do not readily lend themselves to true HMO operations. At the present time

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there are three separate plans operating in this manner in the state of Illinois, none of which is very successful.

The third possibility for the formation of an HMO in Illinois would be for a corporation to form under the Secretary of State's Office for its chartering authority but to submit voluntarily to Department of Insurance regulation and seek a no-action letter from the Department of Insurance, whereby the department will not issue a charter but will regulate the HMO. This approach has been sought in the state of Illinois because of the obvious problems with the insurance company approach and because the Voluntary Health Services Plan Act is not completely applicable to all instances. For example, in the one instance in the state of Illinois where the no-action letter approach has been sought, the HMO is intended to be a for-profit operation. The Voluntary Health Services Plan Act does not allow for a for-profit corporation to form—this is a not-for-profit act. By forming the corporation under the Secretary of State's Office and receiving a no-action letter from the Department of Insurance, the corporation is in all ways under the jurisdiction of the Department of Insurance. The only difference, of course, is that the charter was secured from the Secretary of State's Office and not from the Department of Insurance. This difference is very important on the corporate side because it does allow a for-profit HMO to become possible and viable. Unfortunately we have not yet approved this approach.

The above are the three basic methods by which an HMO corporate structure can be derived in the state of Illinois. At the present time there are at least five separate types of HMO's that I have noted in various stages of development or operation in the state of Illinois. These are as follows:

1. *Community-developed HMO's.*—These are generally sponsored or at least are initiated by a concerned group of citizens in a given community. We have at present two such plans in various states of formation in the state of Illinois. Although these individuals certainly have good intentions, they lack the expertise, the money, and the full-time professional help necessary to run the program. So far, the results have been much brainstorming with a few good ideas, but nothing positive in the way of an HMO. The two attempting to form at the present time anticipate operations within the next twelve months. This approach is much slower to develop than the other approaches, principally because of the lack of expertise.

2. *Hospital-developed HMO's.*—These are generally sponsored or initiated by a hospital and its staff. We have three such plans operational in the state at this time. All three plans were developed by the staff of the hospital, and the only coverage offered at present is for the staff members and their families.

One of the plans is, at the present time, attempting to expand into the surrounding neighborhood. All hospital-based HMO's that I have seen in the state of Illinois so far have had the money, some of the expertise, and the full-time professional help to run the program, but their motivation is not the same as that of the community-developed HMO. The hospital-developed plans fairly generally are viewed as a continuation of the same basic structures in the medical delivery system. The hospital itself really is not placed on any risk, nor are the doctors actually placed on any risk. These plans have emerged very quickly but have not yet developed to any degree.

3. *Physician-developed HMO's.*—We have several of these operational in the state of Illinois at this time, and another group is currently attempting to form under the no-action approach. The operational plans have formed under the Voluntary Health Services Plan Act. These groups are basically much closer to the HMO concept than are the hospital-based plans—particularly in the HMO developing on a for-profit basis. The doctors are genuinely on the risk. Additionally, the doctors have entered into contracts with several hospitals whereby the hospitals will be placed on the small portion of the risk—at least they will be guaranteeing certain cost items. By and large, the physician-developed programs have developed quite rapidly and become operational very quickly. Their problem frequently becomes one of management—they simply need good managerial people to run their HMO's. This really leads into the fourth type of HMO that is being developed.

4. *Entrepreneur-developed HMO's.*—At the present time an entrepreneur is attempting to develop an HMO in the state of Illinois. Basically, he approaches doctor groups who want to form HMO's, and he offers to provide all the managerial services necessary—premium billing, benefit package design, clinic development, and financing of clinics, as well as new-doctor staffing, contract development, and any of the other features necessary to make an HMO a viable entity. For these services he charges a flat percentage of the capitation rate. The entrepreneur involved in the state of Illinois certainly knows what he is doing as far as developing an HMO is concerned. He has money available, and he has the managerial expertise necessary to run the operations. Doctors in essence enter into contracts with him and become his employees. For their services he pays them generous salaries and provides substantial tax benefits and employee benefits because they are working for his corporation. Once he has the doctors signed up to his plan, he then can sign up the hospitals on fairly restrictive contracts. By proper contractual arrangements, the doctors, the hospital, and the entrepreneur are all placed on the risk. Each has a function to perform and the parameters within which to operate. If one group exceeds these parameters, it absorbs the loss. Conceptually, this appears at the present time to be the most viable entity extant. The only problem, of course, is the potential “blue suede shoe” operator. We have to be extremely careful when the entrepreneurs enter this field. They have charisma, they have money, and they have expertise. However, not all of them have the ethics necessary to make HMO's succeed.

5. *Insurance company-developed HMO's.*—At the present time we have several experiments by insurance companies to develop and run HMO's. In one instance an HMO was formed under the Voluntary Health Services Plan Act—the not-for-profit section—and then entered into a contractual arrangement with an insurance company. From a formative standpoint this HMO was formed and actually became operational within a very short period of time. From a practical standpoint there has been some reluctance from the doctors and the various clinics and hospitals to join this HMO. I personally question whether or not the doctors are actually participating in any of the risks. Without the participation of the doctors in the risk, I do not believe that HMO's can become viable entities. By and large, insurance company-run HMO's are meeting resistance in the state of Illinois at the present time. This need not always be the case, but it certainly appears to be the case at the present time. There simply seems to be a negative reaction whenever an insurance company becomes involved in an HMO.

As regards the concept of HMO regulation, I believe that it is essential that the state insurance departments be involved—at least from the financial integrity standpoint. I am advocating the state insurance departments not necessarily because they are so good at regulation but rather because no other departments in state government are staffed with individuals capable of performing financial examinations or capable of auditing financial statements. Thus the department of insurance wins by default. In virtually all states the department of public health has become one of the primary entities involved with the regulation of HMO's. I do not know precisely what the situation is in other states, but in the state of Illinois the Department of Public Health is not the proper agency for utilization review. Its function is more concerned with quality than with use. Accordingly, we are attempting to shift the HMO emphasis over to the State Comprehensive Health Care Planning Agency. This is an agency whose sole function is to monitor the health care delivery systems throughout the state of Illinois. This agency continually monitors utilization as well as quality of care, and thus it would seem that this is the appropriate agency to review and monitor HMO development. Essentially, dual regulation is inevitable with the HMO's. Someone has to monitor the financial aspects, and someone has to monitor the utilization and quality aspects of the HMO. The Department of Insurance is not equipped to handle the quality and utilization aspects, and the Comprehensive Health Care Planning Agency is not equipped to handle the financial aspects.

With regard to the NAIC model bill, I see several problems. First, there is no financial requirement relative to HMO's in that bill as contemplated. I feel that this is not correct. Any financial entity such as an

HMO certainly should have some type of minimum capitalization requirements. Additionally, there should be some type of minimum operational requirements or constraints placed upon insurance companies. At the present time it requires \$1.25 million dollars to form an insurance company to write life or health insurance in Illinois. I believe that there should be some minimum requirements for an HMO—at least \$100,000 and preferably \$250,000. Also, the current bill is not specific on reserve requirements. I do not want an overly restrictive set of requirements, but I feel that some guidelines are necessary. Performance bonds can help reduce these requirements, but someone has to set up contingency reserves to cover the potential hospital cost. Even with contractual arrangements between the HMO's and the hospitals, it is entirely possible that a financial drain could occur. Contingency reserves of some reasonable magnitude are essential. I am hopeful that the model HMO bill will be amended sufficiently in the various states to cover these items. Nothing will kill this movement faster than an insolvency wherein many people are hurt financially.

MR. ALFRED L. BUCKMAN: The number of registered HMO's in California is growing by leaps and bounds. Under the Knox-Mills Health Plan Act of 1965, California-operating HMO's must register with the Attorney General's Office. As of April, 1971, 53 groups had been so registered; in January, 1973, the number had grown to 86; and as of June 4, 1973, the number had increased to 120. Not all of these registered groups are active, but the rapid growth of the number of groups registered in California is indicative of a major trend in the manner in which it is believed a considerable portion of our population will soon be receiving its medical service.

A major question requiring quick resolution is the degree of involvement of the insurance industry in the burgeoning HMO industry. If insurance companies do not involve themselves quickly in this activity, they may find the field overcrowded and thus be unable to make a meaningful contribution to this method of delivering health care to the population. A few companies have already become involved with HMO's, and my remarks are related to the insurance company involvement that has already taken place.

In a bulletin dated February 1, 1973, the HIAA listed thirty-four insurance companies which were known to have some degree of active involvement or exploratory interest in fifty HMO developments. Involvement might be with respect to the planning stage (including actuarial

assistance and design of benefit package), administration, marketing, financial support, or underwriting any portion of a prepaid medical practice program. Of the thirty-four interested companies, sixteen were listed as already participating in operational HMO's. I sent a questionnaire to each of these sixteen companies to determine the nature and degree of their participation in the HMO's and to learn more about the benefit provisions, financial structure, and expectations of these HMO's.

Of the fourteen companies that replied to the questionnaire, five indicated that they were involved in a marketing capacity only in the Harvard Plan, which is located in Boston and nearby contiguous areas. One of the companies that did not reply to the questionnaire is believed to be involved only in the Harvard Plan. The other company that failed to reply reported on its participation in an HMO at an HIAA meeting in Chicago last September. One company was actively engaged in two operating HMO's, and, in addition, this company was also one of the marketing companies for the Harvard Plan. No other company was involved with more than one HMO, except in a marketing capacity.

In summary, then, I have data on only nine different operating HMO's in which insurance companies were actively involved other than in a marketing capacity as of February 1, 1973. Except for the two HMO's in which one company alone was involved in a financial way, each of these nine HMO's differed from each of the others in many major respects, so that it is safe to say that the industry has not yet developed a pattern for starting, structuring, and operating HMO's. Perhaps standardization will begin to evolve after the NAIC recommended model bill on HMO's is adopted by the legislatures of most of the states.

There are a number of different ways for an insurance company to become financially involved with an HMO. The insurance company can start an HMO from scratch, as Connecticut General did in Columbia, Maryland, and in Phoenix, Arizona. In Columbia it formed a partnership with Johns Hopkins Medical School. It provided the finances for building a local hospital and clinic, marketed the plan among all the residents in the community, and joined with Johns Hopkins in the administration of the plan. In Phoenix it formed a partnership with a group of doctors, helped finance the doctors during the organization of the plan, built a clinic, and made an arrangement with a nearby hospital for hospitalization facilities. The doctors in both plans are on salary and receive bonuses at year end, depending on that year's financial operations. Another way to become involved with an HMO would be for the insurance company to join or form a partnership with a hospital or with a group of doctors and

a hospital. A number of insurance companies are joining with independent HMO's, without financial involvement, only to market the program by offering dual choice of coverage under group medical insurance programs, as, for example, the Harvard Plan, whereby individuals may choose to receive medical treatment by the HMO instead of treatment by private doctors on the usual fee-for-service basis. Another type of involvement is that of USLIFE of California (formerly Commonwealth Independence Life), which has been selling group hospital insurance benefits for more than twenty years in conjunction with the Ross-Loos Medical Group of Los Angeles. The Ross-Loos Medical Group is one of the oldest prepaid medical group plans in the country. It started in 1929 and has about 120,000 members; 43,000 are family members. One company is involved not only in one active HMO; it is providing actuarial and managerial assistance on a fee basis for several independently operated HMO's.

Insurance company involvement in HMO's, except for the USLIFE of California involvement with the Ross-Loos Medical Group, began in 1969, when the Metropolitan started sponsoring the Washington University Plan of St. Louis, Missouri, with a financial grant. This plan is essentially autonomous and operates independently of the insurance company, except insofar as it supplies data to the insurance company. In October, 1969, two insurance company-sponsored plans were started. They are the plan in Columbia, Maryland, and the Harvard Plan in Boston, which is jointly sponsored by ten insurance companies and the Massachusetts Blue Cross. Three plans started in 1972, and two plans involving insurance companies started operations on January 1, 1973. One is scheduled to start operations on July 1, 1973.

The locales in which insurance company-sponsored HMO's are operating are widely scattered, and, according to the HIAA, are located in Albuquerque, New Mexico; Boston, Massachusetts; Columbia, Maryland; Chicago, Illinois; Green Bay, Wisconsin; Los Angeles and Orange Counties, California; Minneapolis, Minnesota; Phoenix, Arizona; St. Louis, Missouri; Stevens Point, Wisconsin; and Wausau, Wisconsin.

The benefits provided by HMO's are generally very broad, with emphasis on preventive care. Periodic physical checkups are provided and encouraged. Doctors' visits in office or clinic are provided at no charge in some cases, or, in others, at a nominal fee of \$1 or \$2 per visit. The Harvard Plan, which has two levels of benefits and premiums, charges \$1 per visit in its so-called regular plan and \$3 per visit in its so-called low plan. Home visits are generally provided at \$5 per visit, although two HMO's charge \$10 and one charges \$5 for the first visit and \$2 for sub-

sequent visits. Maternity benefits, home therapy, prescription drugs, and psychiatric care are provided by all plans, but with varying coinsurance charges and limitations.

These low or zero charges for medical care produce the desired effect of encouraging subscribers to visit doctors for treatment of the first signs of illness and thus tend to prevent more serious illnesses. This was the experience of the Washington University Plan in St. Louis, according to a report given at last September's HIAA meeting in Chicago on HMO's. At this meeting Mr. Martin Dickler of the Metropolitan reported that persons covered by the HMO in the Washington University Plan received more medical treatment, but less hospital confinement and surgery, than a similar control group of persons that received medical treatment from their own choice of doctors on the traditional fee-for-service basis. Mr. Dickler reported, however, that the increased cost of medical treatment of the persons in the HMO more than offset the savings in reduced hospital confinement and surgeries.

Prepaid fees by subscribers vary by plan. In a few cases, rates vary by age and sex, but, generally, they are the same for all families and individuals, regardless of age or sex, except for persons over age 65 covered by Medicare. In all insurance company-involved HMO's, only group insurance is written. In most cases the employer pays part or all of the fee for employees, and in some cases for the families as well. Fees for families run as high as \$60 per month but vary with the location of the HMO, the amount of services provided, and the amount of coinsurance charged for such items as doctors' visits in office or home, maternity benefits, psychiatric benefits, prescription drugs, glasses, and hearing aids.

The nation's total health bill, which reached \$83 billion in 1972, will probably not be reduced with widespread development of HMO's. HMO's will make available more comprehensive coverage to more middle- and low-income families, hopefully with little change in over-all cost of medical care to the nation. On the other hand, because doctors are providing services for salaries or for capitation fees rather than for service fees, HMO's are expected to contribute a braking effect on the rising medical costs.

For any plan to be successful, it is most essential that the doctors have a financial incentive for the success of the plan. When doctors work on a salary or capitation basis, they have a natural incentive for the success of the plan. In the plans in which companies are involved on more than a pure marketing basis, doctors are remunerated on a salary basis or on a capitation basis, except for one plan under which remuneration is on a

modified fee-for-service basis. Remuneration of specialists and other providers of unusual treatments is generally on a fee-for-service basis. Doctors who are on the fee-for-service basis generally receive lower than usual fees. In the fee-for-service plan in which an insurance company is involved, doctors have some incentive for the financial success of that plan because full fees are restored out of expected reduction in cost of hospital confinement.

Insurance company investment in HMO's varies from small amounts in cases where the insurance company serves primarily as a marketing arm of the HMO, to amounts as high as \$1.5-\$2 million in cases where the insurance company assumes all the financial responsibilities of the HMO, including the providing of facilities and payment of salaries of the physicians. In some areas the insurance company invests nominal sums in partnership with existing groups of doctors, clinics, or hospitals. Each arrangement appears to be individualized and geared to the particular HMO.

It is estimated that insurance company investments in HMO's are recovered in five to ten years. A new HMO is expected to reach a break-even point after three to five years, with 20,000 to 30,000 enrollees. Of the plans currently involving insurance companies, the enrollments in April, 1973, varied from 2,200 for a plan started January 1, 1973, to 34,000 for the Harvard Plan, started in October, 1969.

Some of the plans have already had to make changes in their fees or benefits because of rising costs, particularly hospital confinement costs. A convenient way of changing costs is to increase the coinsurance charge for doctor visits or for maternity benefits or for psychiatric care. The coinsurance charge for psychiatric care has been increased in one plan. Most plans are too new to have sufficient experience on which to determine whether rates, benefits, or coinsurance features need revision.

One vital question for insurance industry involvement in HMO's must be resolved at an early stage. That is the question of competition. Obviously, in small cities of less than 50,000 population, it is not possible to support more than one HMO on an economically sound basis. If one exists in such a location, then all insurance companies operating in that area should serve as marketing arms for the HMO, to help it reach sufficient enrollment to be economically self-supporting. What about cities of 100,000 population? 250,000? 500,000? 1,000,000? Even a metropolitan city of several million inhabitants cannot support, on an economical basis, too many HMO's. Unquestionably, competition is good and is generally healthy for any enterprise. But too much competition

in any given area can be ruinous for all parties concerned. Thus, co-operation among companies is to be desired. A good example of such co-operation is found in the Harvard Plan, where ten insurance companies, together with Blue Cross, are co-operating to market that plan on a dual-choice basis along with the individual companies' regular group medical plans. Several companies have offered dual choice of benefits in conjunction with the Kaiser-Permanente Plan in California. Several companies likewise are offering dual choice of benefits with other established HMO's, even those in which other insurance companies are financially involved. This type of co-operation within the industry is commendable indeed.

There are challenges to the insurance industry to continue to justify its long participation in the financing of medical service to the public. There are critics who say that the insurance industry is in part responsible for the rapid inflation in recent years of the cost of medical care. Others say that the insurance industry has made no effort to improve the method of distribution of medical services, which is still operating as in the horse-and-buggy days in an era when streamlined distribution of such services can be had.

The HIAA has gone on record with its support to the National Health Care Act, also referred to as the Burluson-McIntyre bill (House Bill 5200 and Senate Bill 1100). This act would establish minimum national health care standards and make provision for the insurance industry to share in the distribution of medical care, mainly through HMO's, but retaining the alternative of the personal doctor approach. The industry owes it to itself and to the public to show leadership in helping to establish and to operate HMO's so efficiently that, for a considerable portion of our population, the transition from the old method of receiving medical care to the new method under HMO's will be made smoothly. By the end of the 1970's, it is expected that as much as half of our population will receive medical care through HMO's, whether or not a national health care program is enacted by Congress. If this is true, then the time is now for insurance companies to decide whether or not to get involved in this industry.

According to the February 1, 1973, bulletin of the HIAA referred to above, twenty-three additional companies have indicated their intention to become involved, but apparently only sixteen companies are now involved with active HMO's, many on a marketing basis only; only nine active HMO's are now being administered or financed by insurance companies.

MR. RICHARD ANDERSON:\* I would like to shift attention from the broad spectrum of HMO types and focus on the experience of the form of HMO which I represent: the Kaiser-Permanente Medical Care Program—a hospital-based group practice prepayment plan. In my presentation I will (1) provide you with a brief description of our program; (2) illustrate our basic characteristics and operating principles through our approach to health plan rates and benefits; and (3) identify major problem areas in our program.

First made available to the public in 1945, our program organizes and provides prepaid hospital, medical, and related services on a financially self-sustaining basis to about 2,600,000 persons, including subscribers and their dependents, in six geographical regions: northern California (San Francisco Bay Area and Sacramento); southern California (Greater Los Angeles Area and San Diego); Oregon (Greater Portland and Vancouver, Washington); Hawaii (Oahu and Maui); Ohio (Greater Cleveland Area); and Colorado (Greater Denver Area).

The Kaiser-Permanente Medical Care Program, through its participating organizations, is the largest group practice prepayment plan and the largest nongovernmental health care delivery system in the United States.

In simplest terms, this program consists of three principal parts, as follows:

1. *Kaiser Foundation Health Plan.*—A nonprofit corporation which enrolls members, maintains membership records, collects prepaid dues, and contracts with the Permanente Medical Group and Kaiser Foundation Hospitals to provide outpatient and inpatient care.
2. *Permanente Medical Group.*—In each of our six regions an independent, legally separate Permanente Medical Group contracts to provide professional services, both in and out of the hospital, to our health plan members.
3. *Kaiser Foundation Hospitals.*—A nonprofit corporation which contracts to provide inpatient care in hospitals which are, by and large, program-owned.

The contracts that tie these entities together represent a responsibility assumed by our program, to organize and provide health care services to our enrolled members. This assumption of responsibility is the fundamental feature that distinguishes our program from fee-for-service prepayment plans which reimburse but do not directly provide medical, hospital, and related services.

The members of our program are widely diversified and composed mostly of working people and their families. All of our members *voluntarily*

\* Mr. Anderson, not a member of the Society, is a medical economist with the Kaiser Foundation Health Plan, Oakland, California.

elect coverage under our plan. The great majority join the health plan as members of an employee group or as members of a union or an organization such as a consumers' co-operative. We consider it essential that the employer or association, in offering a prepaid health care benefit, make available a meaningful choice between significantly different types of prepayment plans. This choice must be offered both at initial enrollment and periodically thereafter.

I mentioned that our program is financially self-sufficient. How do we generate the revenue required to meet our capital and operating needs? The bulk of our revenue comes from the members to the health plan in the form of community-rated, prepaid monthly dues. (As we apply it, community rating means that for a given benefit structure and for the same size family, dues rates are the same regardless of utilization experience.) The health plan, in turn, pays the medical group a budgeted capitation amount. (By capitation, I mean a fixed amount of money per health plan member per month, regardless of whether or not that member is seen as a patient.) In addition, the health plan pays Kaiser Foundation Hospitals' budgeted net cost.

Our revenue structure is planned to cover all costs of operation, including interest on borrowed funds and depreciation. It is also planned to produce an excess over operating costs for the health plan and hospitals components in order to meet capital requirements of the program. All revenue received from our health plan members is used for the benefit of our members.

It is evident that, in planning our revenue requirements, we need to have good information about one key statistic—our enrolled membership. Our revenue, costs, utilization rates, staffing ratios, and planning functions all relate to the characteristics of our enrolled members.

To serve a defined population of approximately 2.6 million members, what does it take, operationally, for the Kaiser-Permanente Medical Care Program to meet its contractual responsibility?

For these members our program has approximately 2,500 full-time equivalent physicians, 19,500 nonphysician personnel, 23 acute general hospitals (comprising more than 4,700 licensed beds), and 58 outpatient centers. For calendar year 1972 the total revenue was \$454 million. At year end the investment at cost in land, equipment, and buildings was \$348 million, and the total outstanding debt to institutional lenders was approximately \$136 million.

During 1972 the program grew by approximately 200,000 members. What does such growth entail in terms of additional responsibility? For

200,000 new members we must recruit nearly 200 M.D.'s and the equivalent of 1,500 non-M.D. personnel, including 240 registered nurses. We must provide 200 doctor's offices and some 360 hospital beds. *At current levels* the total investment in capital for these 200,000 members would be \$50 million. This is roughly equivalent to \$250 per member for capital requirements including hospital and outpatient facilities.

Thus far I have mentioned or alluded to a number of basic features and operating principles of the Kaiser-Permanente Medical Care Program. The nature of our health plan rates and benefits reflects the characteristics of our program and may give some clues about how they evolved as follows:

1. Community rating, for example, ties in directly with the principle of operating as a hospital-based program with integrated inpatient and outpatient facilities. A consequence of this principle is that we have substantial fixed and semifixed expenses in our operations. A program predicated on fixed costs requires maximum stability of membership and financing. Community rating—reflecting the broadest spreading of risks—is the best assurance of stability.

2. Community rating is in accord with another program principle, namely, prepayment. Here I am referring to prepayment to the provider of services on essentially a capitation basis. Under this method of payment our doctors assume the risk of living within a budget. By being at risk, they are penalized if they provide unnecessary services. This results in a reversal of the incentives which prevail under the fee-for-service method of payment. Community rating facilitates the prepayment concept by removing the necessity for us to develop fee schedules, claim-processing procedures, and other features of fee-for-service payment and experience rating.

3. Maximum stability of revenue can be achieved under another of our program's basic principles, namely, group practice. The organization of physicians into self-governing multispecialty groups with working methods that integrate the various aspects of health care delivery creates stability and predictability in both expenses and prepaid rates.

4. The services which we organize and provide cover the entire spectrum of "appropriate medical care," including outpatient care, inpatient care, extended care, home health care, drug coverage, and mental health services. Although all members receive the same service and have the same facilities available to them, various schedules or "coverages" are available. The basis for distinguishing among coverages relates to how much is included in the prepaid rates and how much is paid in supplemental charges at the point of service. The choice that is open to our membership groups is between having most services available under one prepaid coverage and selecting a coverage, with significant benefit restrictions, for lower prepaid dues. The options permit us to serve a wide variety of population segments and achieve the balance and stability in membership that our fixed-cost operation requires.

5. The variations in coverages and health plan rates among our six regions illustrate their independence and autonomy. Differences in coverage are a function of a set of factors unique to each region, including local medical practices, preferences of health plan groups, costs, and evolution. This latter factor is especially noteworthy. Each region's concept of what is comprehensive coverage is constantly expanding. Prepaid benefits for psychiatric care, outpatient prescription drugs, and eyeglasses were nonexistent in the program ten years ago and are now well established. The development of coverages for drug addiction, alcoholism, and dental care are on the horizon.

6. Comprehensive services benefit doctors and health plan members alike. When considering courses of treatment, our doctors have the option of choosing from a wide array of services for the most suitable form of treatment. In effect, cost barriers to specific services have been reduced or eliminated as factors influencing medical judgment.

7. Our health plan benefits reflect another basic principle of our program, namely, preventive care. It has made economic sense for us to focus attention on prevention and early detection of disease, in addition to outpatient and inpatient care. Therefore, periodic health examinations, eye refractions, and hearing tests are integral parts of our basic prepaid coverages.

To summarize, the nature of our health plan rates and benefits is consistent with the basic principles of the Kaiser-Permanente Medical Care Program. Like those principles, our rate and benefit structures have evolved, in a trial-and-error fashion, as a pragmatic response to our program's efforts to rationalize the delivery of health care.

It is a truism that all organizations, especially labor-intensive ones, have problems. Some of our major problems may be of interest to you. The following list is nonexhaustive and omits consideration of a problem common to all large organizations, namely, that of obtaining management personnel of high caliber.

1. The first problem on my list relates to cost increases over which we have little or no control. Inflation and costs associated with advances in science and technology are examples. We have had no more effective insulation against rapid increases in the costs of construction and labor than has any other sector of the health care economy. Many such costs are determined by forces outside our control; some are not even tied specifically to the health care industry.

2. A second problem relates to concerns which we, as institutional providers, have about regulations imposed under Phase 3 of the economic stabilization program. We have some problems of substance in the area of regulation of compensation for personal services, particularly for physicians' services. If we are to continue to attract and hold capable doctors, their compensation must be competitive, in terms of prevailing income levels. Our physicians do not have the option open to fee-for-service practitioners of increasing the volume

of services rendered to increase revenue. Our concern does not relate to the imposition of regulations per se but to the effect of economic stabilization policies which may not give HMO's an equal opportunity to attract physicians by offering a competitive compensation structure that may be reflected in charges to members.

3. Another problem relates to external controls over construction of our facilities. I mentioned that, where possible, we have endeavored to operate hospital-based medical centers to serve our members. We are convinced that this notion is sound in terms of continuity of patient care, efficient use of our doctors' time, and economics that can be realized in a hospital-based setting. We are concerned, therefore, about facilities planning policies that do not recognize our specific obligation to serve a *defined population* of enrolled members. The issue is not one of endorsing or not endorsing planning efforts. It is our concern that we will not be able to fulfill our responsibility to provide inpatient care to our members if planners ignore the defined population concept.

4. A related problem pertains to constraints on our ability to generate revenue to meet our capital requirements. In large part these constraints have so far been manifested in the form of legislative limitations on reimbursement for capital expenditures. In 1968 the Medicare legislation introduced a reimbursement formula for Part A services that did not recognize capital requirements beyond what could be provided for by allowances for depreciation and interest. The recently enacted Medicare amendments of 1972 placed further restrictions on reimbursement for capital needs. Although the Medicare law applies only to a small segment of our health plan membership, we are concerned that Medicare reimbursement features will be extended to other legislation—for example, a national health insurance bill. In such an event, our ability to generate the financial requirements necessary for replacement, acquisition, or construction of facilities could be seriously compromised.

5. I will mention in passing one final problem that relates to another aspect of the 1972 Medicare amendments, namely, the HMO provisions which became effective on July 1. As of this late date, the Social Security Administration has not issued any regulations on this subject, nor has it shed any light regarding actuarial approaches to reimbursement and the provisions of proposed contracts. Accordingly, we have not made any decisions with respect to the HMO options.

This brings me to a final point: HMO's may not thrive in view of current or proposed obstacles to their successful operation. If our program and other variations of the HMO strategy are to carry out the hopes expressed for them, these obstacles must be removed or avoided.

MR. ANTHONY J. HOUGHTON: Our company has a client who has run an HMO for employees of a single company for over seventy years. It has a membership spread over several states, including retirees in every state. Its facilities include two hospitals, a staff of full-time doctors,

a large number of participating doctors who agree to accept a modest fee schedule for services rendered HMO members. For emergency services or out-of-area services, an alternative benefit schedule with dollar limits and coinsurance applies.

The success of this HMO appears to involve several factors, including (1) compensation to staff doctors which encourages out-of-hospital treatment; (2) low cost of nonstaff doctors based on a prearranged fee schedule; (3) efficient hospital operation which does not provide certain services, such as obstetrical, pediatric, and psychiatric; (4) good enrollment, providing a favorable cross-section of risks.

When the HMO was asked to study the feasibility of making services available to other members, including Medicare, Medicaid, general welfare, and dual-choice group members and others, new problems arose—for example, mandated services which it does not now provide, including dental, chiropractic, and other services. Also, the relationship with several new policyholders, such as the federal government, state welfare departments, and commercial companies, requires other specialties and, in some cases, an entirely new statistical reporting system. The insurance department in the state was rather negative in its attitude toward allowing a nonprofit employee benefit association to expand its charter.

All these problems appear to be typical of starting an HMO.

MR. ABE OLSHEN:\* What plans or steps are being taken to introduce dental practice under HMO's?

MR. PAWELKO: At the present time in the state of Illinois a group of dentists is forming a group prepaid practice plan utilizing the basic HMO concepts. I see no reason why this group, once it is operating effectively, cannot enter into arrangements with other HMO's or insurance company plans to provide prepaid dental benefits based upon HMO concepts of prefunding. Additionally, several other HMO's which are being formed in the Illinois area are considering including dental benefits in their programs. These benefits would be included through a dentist on the staff of the HMO. Dental practice lends itself very well to the HMO concepts, and I believe that we are going to see many HMO's that include dental benefit programs.

MR. HOUGHTON: What is the minimum size required to make it economically feasible to operate an HMO?

\* Mr. Olshen, not a member of the Society, is a member of the American Academy of Actuaries and is engaged in actuarial consulting work in San Francisco, California.

MR. ANDERSON: I would hesitate to specify a minimum-size requirement that would guarantee "economic feasibility" for a fledgling HMO. The minimum size depends on a number of factors, including the HMO's organizational structure, its operational requirements, the diversity and stability of its potential enrollees, and the nature of involvement of professionals. For example, the minimum membership required for the successful operation of a hospital-based group practice prepayment plan with sizable fixed costs is essentially irrelevant to a foundation for medical care or some other HMO variation.

To illustrate the difficulty in offering a general rule, I can cite the experience of our two newest regions in Cleveland, Ohio, and Denver, Colorado, in terms of membership growth and economic self-sufficiency. The total Ohio region membership, including subscribers, spouses, and dependents, numbered about 33,000 when the region became affiliated with the Kaiser-Permanente Medical Care Program in January, 1969. At present it has 80,000 total members. In contrast, our Colorado region started with 700 members in July, 1969, and has grown to 46,000 total members. As of May, 1973, neither region was economically self-sustaining—this in spite of the fact that both regions were established under favorable conditions, such as large metropolitan communities, sound local economies, relative absence of legal barriers, commitments of plan physicians and management, co-operation of other community health care providers, and sources of adequate capital to meet start-up costs.