

**TRANSACTIONS OF SOCIETY OF ACTUARIES  
1969 VOL. 21 PT. 2 NO. 61**

**DIVERSIFICATION OF LIFE COMPANIES  
TO FINANCIAL SERVICES**

1. Definition of subject for discussion:
  - a) Includes expansion within the insurance business into new lines not previously offered: for example, health, group, property and casualty, variable annuities, mass marketing, pensions.
  - b) Includes, but is not limited to, such financial services as the following:
    - (i) Mutual funds.
    - (ii) Trust services.
    - (iii) Investment management services.
    - (iv) Finance company.
    - (v) Banking.
    - (vi) Leasing.
    - (vii) Venture capital.
    - (viii) Loan guarantees.
    - (ix) Pension consulting.
    - (x) Real estate syndication.
    - (xi) Title insurance.
    - (xii) Savings and loan associations.
  - c) Excludes consideration of nonfinancial diversification possibilities.
2. Extent and nature of interest in such additional financial services:
  - a) Relationship to existing business.
  - b) Synergistic possibilities.
  - c) Profit expectations.
  - d) Potential hazards.
3. Current position of panelists' companies as to (a) range of interest and (b) moves made so far.
4. Extent and nature of impact on organization:
  - a) Corporate structure.
  - b) Demands on general management personnel.
  - c) Marketing strategy, marketing organization, sales compensation.
  - d) Compensation or other personnel problems.
  - e) Special aspects for mutual companies, Canadian companies.
5. Regulation:
  - a) Federal.
  - b) State-province.
6. Planning:
  - a) Definition of total enterprise.
  - b) Commitment of money and people resources.
  - c) Marketing strategy.
  - d) Profit-risk equation.

MR. COLIN C. HAMPTON:\* We are firm believers in Peter Drucker's purpose of any corporation—to create a client. Another way of putting it—to satisfy wants and needs. In our case, as a mutual company, the consumer or the customer is the owner, so the principal beneficiary, if you will, is our policyowner.

Our board of directors is a little more practical than I am. They are hired by the policyowners to serve them, and they want to make certain that the policyowner is the one who is going to be the principal beneficiary of anything we undertake to do. If we do well in what we are doing, we feel that all those associated with the Union Mutual will benefit as well. So we have established “who benefits.”

Why did we take the plunge earlier this year to determine that we would become a so-called full financial service organization? Without going into all the details, we have for many years looked into the demographic, economic, social, and political trends that are going on here in the United States and have concluded that the future of our industry lies in the full financial services concept.

That is the why of it. What have we done?

Earlier this year we set up a so-called downstream holding company which we have named Union Mutual Corporation; it is wholly owned by Union Mutual Life Insurance Company. We have some other subsidiaries which are, in turn, wholly owned by the downstream holding company.

About two years ago we formed an investment company, called Union Equity Corporation, which was set up primarily to make venture capital and risk capital investments. Union Equity is currently a subsidiary of Union Mutual. We are also using that entity as the base for our so-called equity cluster, and it will manage mutual funds. We are currently in registration with one fund. We also plan to have a registered investment advisory company which will also be managed by Union Equity.

Roughly two years ago we joined with seven other companies and formed LINSICO Company, which is a broker-dealer, and we permitted our agents to become licensed through that company so that they could sell other mutual funds.

Our next step was to acquire, this summer, a small stock life insurance company. It serves primarily as a vehicle to sell stock insurance products in the same states in which we are operating currently, with the exception of New York State.

We have chartered a real estate company. Like Union Equity, this

\* Mr. Hampton, not a member of the Society, is President of Union Mutual Life Insurance Company.

company has two thrusts: (1) it is an investment vehicle (it is going to manage the real estate investments for the separate subsidiaries) and (2) it is going to sell a real estate syndication and real estate investment trust through our field force.

We have another company which is a service subsidiary to our long-term disability reinsurance operations. As of January 1 we will start operating in Canada through another new subsidiary.

MR. MENO T. LAKE: Transamerica is a holding company and the sole owner of Occidental Life and a number of other subsidiaries. In talking about the diversified financial services, I would like to cover all those within the Transamerica family because some are and some are not direct subsidiaries of Occidental. As to why Transamerica chose to go this route, I think I can best say that they have long felt very strongly that there is a tremendous future in two broad areas: financial services of all types and leisure-time activities. So Transamerica, as such, is a service organization in those two fields. Today I will ignore the leisure-time-activity portion of the company and talk about the financial side.

From the standpoint of our own agents and our company, we felt that there were two real incentives for diversifying. The first is in the area of better utilization of our agency manpower; we felt that, if our agents could fill more than just the life insurance needs of their clients, they could make better use of their time and help to offset the inflationary costs of doing business.

The second aspect has to do with recruiting. We feel that the existence of some of these other financial services has been a real asset in attracting bright young men into the field. Many of these we might not have attracted if we had had only life insurance.

Our first step, which began several years ago, was a controlled experiment through which our life insurance agents in Occidental began selling selected casualty coverages, notably homeowners' insurance. This has progressed on a very careful basis, because our predominant thought was that in no way did we want to have our agents take their eyes off the ball as far as life insurance was concerned; if they could absorb these other coverages without hurting their life insurance sales, this would be fine. We felt that the experiment was reasonably successful, and we later enlarged it by the formation of what we call our "department store of finance."

This included, in addition to the coverages I have just mentioned, making available in this one branch office additional financial services in the way of personal loans through the large Pacific Finance Loan Com-

pany, a car-leasing franchise, a mortgage-lending company, and title insurance services. The aim was to offer all these services to our life insurance clients. Life insurance men did not get directly involved in this, but they had the available facilities when they developed a need with one of their clients.

We then formed an investment management company, which was designed both to attract outside clients and to form the research and consulting service for our next move: the formation of two mutual funds, which took place last year. These, too, are sold entirely through our life agents.

Variable annuities are in the offing, and we are planning to enlarge that to what we call the "man-on-the-street variable annuities."

I would like to add just one more comment. It may not fall in the generally recognized definition of diversification, but we like to think that we can diversify within the life insurance field through enlarging our horizons. We attempted to do this about six years ago and started by listing markets elsewhere in the world. We started moving in a definite direction about a year and a half ago, when we opened a branch office in Australia, and we are now preparing to open one in the United Kingdom. We feel that there is tremendous room for diversification of that type right within the life insurance field.

**MR. ANDREW DELANEY:** American General Insurance Company began as a fire and casualty company, and it is still licensed to write an insurance business, although it now has become primarily a holding company.

Its first thrust toward diversification was to acquire life insurance companies, and we have, during the last fifteen years, acquired eleven, three of which we merged and one of which we sold. This means that we still have seven life insurance companies in the group, having approximately ten billion dollars of insurance in force and writing about two billion dollars of new business annually. Also, the parent company has acquired and owns at this time eight fire and casualty companies. In 1939, American General acquired a mortgage banking company, which has operated successfully for all the years since then.

In 1956, we decided that it might become desirable for our salesmen to have variable annuities in their sales portfolio, with the result that we formed the Equity Annuity Life Insurance Company of Washington, D.C. It was the second variable annuity company formed, and, subsequently, we merged it into Variable Annuity Life Insurance Company, the largest variable annuity company, of which we now own 50 per cent.

In 1967, we decided that our field force might need to have mutual funds for sale at some point in time, and we acquired a very small mutual fund management company, which serves as the investment adviser to the First Participating Fund of Boston. After about a year of running that company, we decided that we had some experience, knew something about mutual funds, and wanted a substantial block of funds; we therefore acquired the Channing Financial Corporation, which managed a stable of eight mutual funds, with assets of approximately one billion dollars.

In 1968, we had the opportunity to acquire 34 per cent of the second-largest bank in Houston, the Texas National Bank of Commerce. We felt that it would fit in well with our growing number of enterprises. Earlier this year, we acquired a title insurance company, the Title Guarantee Company of Baltimore. We also formed a leasing company, because we had available to us at that time a very experienced leasing officer. Recently we have entered into an affiliation with one of the world's largest contractors to develop some real estate ventures.

Our reasons for diversifying are really of two kinds. The first reason is simply our desire to be sure that our agency life sales force, which we feel is a very valuable asset, would have available to it all the necessary sales tools. At first we felt that variable annuities were essential. After some experience we do not think they are as essential as we did then. For a variety of reasons, we have made very little progress with the sales of individual variable annuities through our field force. At this moment, we feel that mutual funds and equity products are definitely the wave of the future, and it is in this area that we are doing most of our experimenting.

The second reason for acquisition comes in a different area, and I would say that there are really two parts to it. The first part is that we have a natural desire not to have all our eggs in one basket. Should all or part of the insurance business be taken over by the government or should it fall onto bad times, we would want some other enterprises which would help to stabilize our earnings. Our first purpose, then, is to have earnings from diversified sources, so as to stabilize them. The second part is that we will acquire any enterprise at any time that we think it will improve our profits per share. We are in business to work for our shareholders, and any time that we can acquire anything which will improve our earnings per share, we intend to do so.

**MR. KENNETH R. MACGREGOR:** Companies in Canada have moved toward diversification of life insurance products more than toward diversification to other financial services.

The principal reasons for this are the lack of corporate powers on the part of Canadian companies to provide other services and the full occupation of the whole industry during the last few years on the heavy new taxation proposals which recently were enacted. At present the only other financial services that the Canadian life companies may provide through subsidiary companies are fire and casualty insurance and real estate services.

Many Canadian life companies have an equity interest in real estate companies for investment purposes, but very few have any related fire and casualty operations, and none, to my knowledge, do this business through a subsidiary company. Currently in Parliament, however, are bills that would give federally incorporated companies additional powers to have subsidiaries for mutual funds, for the usual advisory management and sales distribution services, as well as subsidiaries to carry on any other business reasonably ancillary to the business of insurance. It remains to be seen, however, what the latter will embrace or where it will lead.

The downstream possibilities to diversify have been extremely limited, and only very few stock companies—all relatively small—have followed the holding company route. I am not aware of any Canadian life company that has taken the initiative to set up a mutual fund, but a few mutual fund organizations have acquired life company affiliates. Some of these mutual fund organizations have also succeeded during the last year in cracking the long-standing prohibition against dual licensing.

Although Canadian life companies for all practical purposes have not diversified into other financial services, they have moved to offer equity-based policies of various kinds under powers granted in 1961 to set up segregated equity funds for policies with reserves that vary according to the market value of assets and funds.

About one-third of the life companies in Canada today are now offering equity-based policies. Most of these contracts, however, have only become available during the last year or two, and I might say that taxation has been a strong inhibiting factor.

The Mutual Life of Canada has been offering an equity dividend option for more than a year, and we have just recently brought out an equity-based deferred annuity with a guaranteed payout at optional retirement ages. We have a premium disability benefit clause, and payer waiver benefits are available.

As for the reasons for diversification, I think that more and more companies in Canada feel that they must offer some form of equity products, at least as supplementary facilities, to meet the effects of continued in-

flation, the aggressive competition of the banks and trust companies, and, hopefully, to strengthen the position of their field forces.

Apart from the possibility of some companies' entering the mutual fund business directly after the necessary powers are available, diversification will be relatively slow, and I would like to record at this juncture my personal view that I think this is as it should be.

MR. DELANEY: I have the personal conviction that any successful acquisition program has to be performed by top management. I do not think that you can acquire by setting up a corporate acquisition department. It has to be top management of the company in action, and, obviously, this does create great additional demands on its time. When you are acquiring businesses outside the insurance field and top management consists principally of insurance people, you have even more time requirements, since, even though you will consult experts in the particular line of business that you are seeking to acquire, you still feel the responsibility to acquaint yourself with it, to have some knowledge about it, and to be able to form judgments about the value of the things that you are acquiring. There is no question that an acquisition program is very demanding upon top management.

In the acquisition of insurance companies, we did not concern ourselves as much with the caliber of the management we were acquiring, since this was the area of our own expertise. When we acquire something outside the insurance business, where we have no particular expertise, we want good management and are careful to acquire companies with good management in their own areas. This leads to only one other thing: when you acquire this wide variety of companies, you do have a real co-ordination program and need to obtain a high-level staff to co-ordinate the activities of these various enterprises.

MR. HAMPTON: Chart I is a slide that we presented to our board. It explains what we intend to do. One of the things that I might mention in this connection is that we have defined very specifically our so-called business mission; unlike some of the other companies that are going into many different things, we have determined that, in order to go into any field, it must serve at least two purposes. First of all, it must offer a product or service that is designed for and marketed to individuals. Second, it must be financial in nature. If a business does not meet those two criteria, we do not look into it or spend our time worrying about it.

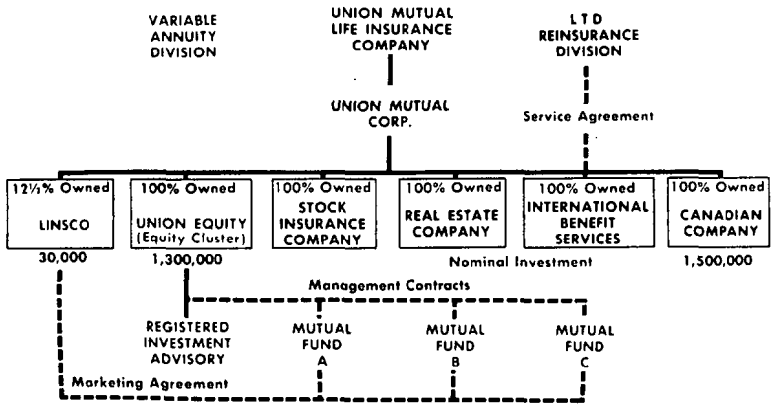
Union Mutual Life Insurance Company (at the *top*) owns the downstream holding company in the Union Mutual Corporation. We also have

within Union Mutual Life a variable annuity division (on the *left*), which will be funded through our mutual funds. Another division within Union Mutual Life Insurance Company is a reinsurance division (on the *right*). This is the legal form that we see.

Chart II is the way we *actually* look at it on a functional basis. The downstream holding company is a management company. We have there all the support functions for these, the satellite companies, which we look upon as profit and product centers. These companies are really marketing operations, if you will. They market the products with which they are involved.

CHART I

TOTAL FINANCIAL SERVICES ORGANIZATION



Since Chart I was made, we have acquired Community Life Insurance Company, which is the insurance company that I mentioned. We have formed Transcoastal and Union Equity, which will manage the mutual funds. The hub company is a management company, and, in order to meet our objectives, we reorganized within Union Mutual Life Insurance Company along these lines.

We look upon the structure of Union Mutual Life as a marketing line function. As shown in Chart III, we have two lines currently—individual and group. Sales of what is known normally as the agency area we call “products management,” which is a new concept as far as the life insurance industry is concerned, although it is an old concept as far as industrial companies are concerned. The function that these lines perform is twofold: (1) make a sale and (2) keep it sold. That is what this organization form is designed to do.



CHART II

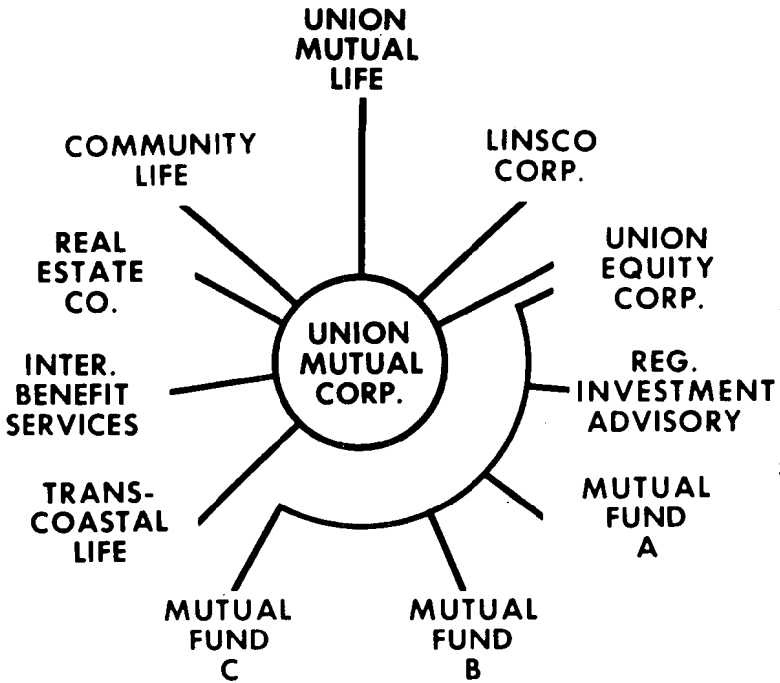


CHART III

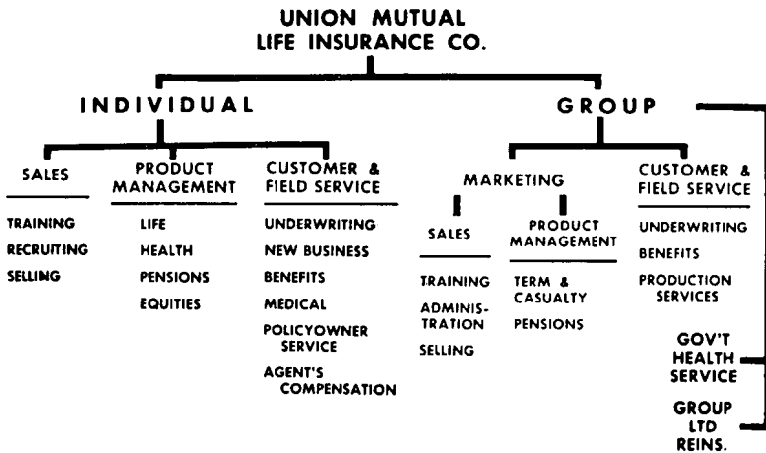
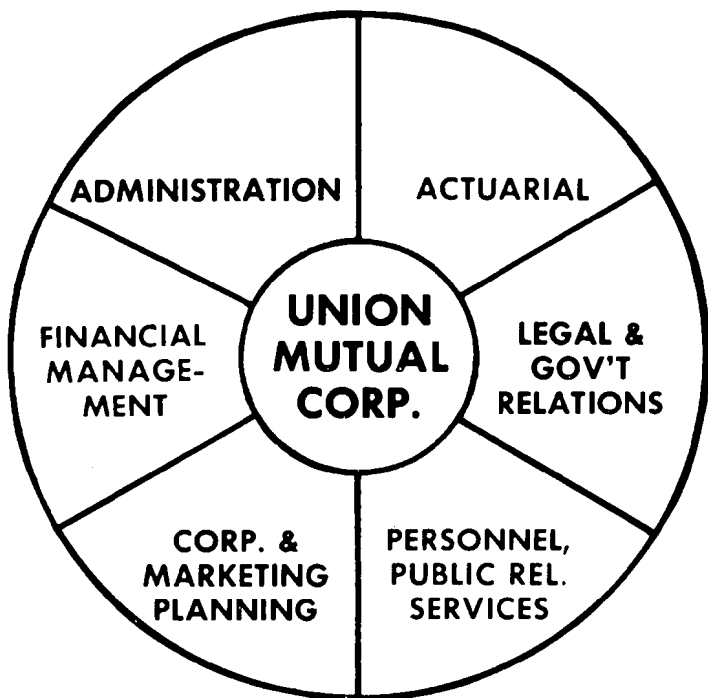


Chart IV shows the holding company, which is a management company, with the six support areas. This is the reorganization that we went through recently to effect the business mission which we have defined and the objectives which we have stated.

We have acquired Community Life, and we intend to provide our agency force with stock products as well as participating products. There

CHART IV



## MANAGEMENT COMPANY

are certain areas where we feel stock products can compete; certainly in some of the business markets and the term field. We look at this from just an insurance standpoint as having a synergistic effect. Our agents today are selling participating business; they are also selling nonparticipating business. We are not, however, getting that business, although we are paying the cost of having them there. We hope that we will be able to get the business that they are now putting over to the stock companies.

Without any additional cost, we feel that we will be getting additional production.

A second company that we have is Transcoastal in Canada, which is a life insurance company. This is our main thrust. It is the business that we think we know.

In Union Equity we will be talking about venture capital deals and real estate operations. We already have investment expertise in these areas.

We look upon this as phase one of our diversification program. None of this is really that far removed from our basic life insurance business. We have not set a specific date when we will go into phase two, but, in rough terms, we are talking about two or three years, during which time we will digest what we have done to date.

We know nothing about the casualty business at this point, but hopefully by the time we get into it, we will. We hope that we can acquire good management.

MR. LAKE: I will comment on some of the things that seem to be working for Occidental and Transamerica. We feel very strongly that one of the biggest cautions is to be sure that the products we add to our life insurance field force's portfolio make sense for them to be selling. We do not want to end up diluting their life insurance efforts by embroiling them deeply in other types of businesses.

We do not expect them to sell car leases or mortgages at all. We don't mind if they don't, but, if they run across a need, then they have a way to handle it. The last thing we want is for them to go off on a tangent and start selling some of these subsidiary services at the expense of their life insurance sales. So far we are very favorably impressed by the results. During the last year we have had about eight hundred of our best life insurance men become licensed for mutual funds and quite a number of them for variable annuities.

As many of you know, this takes quite a large amount of studying, and we were worried about the effect this might have on our life production. During 1969, our life insurance sales in Occidental and the other life companies have shown the largest increase that we have had in a number of years. We feel that putting this extra load on the agents may have helped all around, as well as, hopefully, enlarging their source of clients.

From the standpoint of Transamerica, I think they feel that there is a certain amount of safety in this diversification. For example, right now the finance company is hurting badly from the very high interest rates,

and at the same time the insurance company and many of the others are benefiting from those same high rates.

From the standpoint of manpower, I do not think we can overemphasize the fact that this puts an added strain on all the key men in management; they cannot, or at least they do not, dissociate themselves from any of these new enterprises, and, if you do not think that starting a new one from scratch takes an awful lot of time and thought, just try one.

**CHAIRMAN HENRY R. ROBERTS:** This touches on a question that I might call the "digestive capacity" of a company. You have referred to venturing into new endeavors of one kind or another. Have you any experience or any thoughts on the question from a management standpoint as to how much you can digest over a given period of time? Is there some limit as to what you can do successfully?

**MR. HAMPTON:** There is one factor. We are very limited in the amount of capital that we have available. The law permits us to flow 50 per cent of our surplus into the downstream holding company, which, on our projections for the end of this year, represents about eight and a half million dollars. Again, as a mutual company, we do not have the opportunity to acquire companies with stock, nor do we have the ability to borrow.

This is a limiting factor, but there is no question that the biggest factor is the limited amount of manpower available to get into these new ventures and to do it as quickly as you had anticipated. We had hoped that we would have a mutual fund available by the spring of 1970. It now looks as though it will be June of 1970.

**MR. MACGREGOR:** Mr. Delaney mentioned the need for good top management and the responsibilities resting upon management in any diversification program. The question that I should like to raise is this: "If management has been able to find the time to do these weird and wonderful things, I wonder what they have been doing before?"

For the last five years, at least, the managements of Canadian life companies have been sorely pressed with massive government welfare measures and taxation, but, even if they had more time, I would be very apprehensive about such rapid and complex diversification. In my own experience, the mere takeover merger of a similar kind of company produces enough problems at one time, but what I have just listened to makes me dizzy.

MR. DELANEY: We all recognize that there are limitations to what you can acquire and what you can do, but the dedication, the ability, and the willingness of top management to spend the next eight hours a day after the first eight-hour working day are what make an acquisition program successful.

CHAIRMAN ROBERTS: Wouldn't it be a valid observation to say that, as you become more involved, you suddenly discover that some of the young people in your organization can do some of the things that you were doing? Haven't you found that, when there were many things that you felt compelled to do yourself and could not get to them because of the pressure of other things, these young people could do some of these things for you?

MR. DELANEY: That is a good point. For example, one of our young men who has only been out of school for two and a half years is now the company's actuary—one year after completing his Fellowship examinations. If some of us had not been so active in the acquisitions area, he would not have had that kind of opportunity. Middle management loves this, and the young men coming along are attracted by the wealth of opportunities that they see for themselves in this developing diversification.

MR. MACGREGOR: The bills currently before Parliament affect Canadian companies' corporate powers, but, of course, the bills can do nothing to expand the corporate powers of American or any other non-Canadian companies, which, naturally, derive their corporate powers from their home jurisdiction. There have been and there are now provisions in Canadian insurance legislation which restrict the foreign ownership of Canadian life companies, but those restrictions do not apply to the ownership of Canadian fire and casualty insurance companies.

So, American companies now are free, as far as the law is concerned, to acquire Canadian fire and casualty subsidiaries.

MR. HAMPTON: There is a tax disadvantage from the presence of a downstream holding company owned by a life insurance company. As its assets grow, they accrue to the life insurance company and generate additional life insurance income taxes. I know from talking with some of you on the panel that you have set up your holding companies as casualty companies in order to avoid this problem. We hope that, when we do have that problem, we will rectify it.

From each one of these subsidiaries we hope to obtain a return on our investment capital greater than that which we would get in the life insurance investment portfolio. We plan to flow dividends into the holding company upstream to the life insurance company. Ultimately, the policy-owner will benefit from dividends flowing into the life company.

MR. DELANEY: We look for enhancement of sales of life insurance, although we have nothing to point to so far. Our new business continues to increase every year, but I do not think this is a result of the variable annuities and the mutual funds. We simply feel that these are products we will need in the next few years, and we want to have some experience with them now.

CHAIRMAN ROBERTS: Mr. MacGregor, you referred to government regulations restricting Canadian operations. Is it not true that Canadian insurance companies have succeeded in having the law amended when they wanted, for example, mutualization powers and entry into mutual funds?

MR. MACGREGOR: I find it a little embarrassing to answer that question. I was on the other side of the fence for a good many years when amendments were made. I would not say it has been easy to get the laws amended, but I think there has always been a good understanding between the insurance department in Ottawa and the industry, and, when necessary and desirable, changes have suggested themselves and have received, I believe, a sympathetic hearing. Parliament likewise has dealt with them sympathetically. I cannot say that there is the same degree of success in tax legislation.

MR. HAMPTON: Mr. MacGregor, we have mutual funds and you have an equity-based product. With your product, do you feel it necessary to have a mutual fund, or is the need taken care of in the product itself?

MR. MACGREGOR: I think it is less necessary if companies develop the right kind of equity products. Some life companies, nevertheless, may wish to have a separate mutual fund purchase, and some may not want to risk the fluctuations inherent in an equity-based product. They may want to divorce that kind of operation from their life insurance operations, so that they do not have to answer embarrassing questions later on. I think that some will follow this course, although I imagine they will be slow to do so.

**CHAIRMAN ROBERTS:** Mr. Delaney mentioned earnings per share as one of the motivations of the American General diversification moves. Andy, how would you cope with the delay that you are likely to find in the emergence of earnings per share? As you described them, most of your diversification moves have been effected by acquisitions, but, even here, don't you normally have to pay such a price for what it is you acquire that the earnings per share enhancement would be perhaps several years in the future? Don't you run into this delay? If so, how do you cope with it?

**MR. DELANEY:** Yes, you certainly do, and it probably provides a very great limit on what you can do. We, and I think this is true of most stock companies, are unwilling to dilute significantly our earnings per share. I would, however, like to give one illustration of a situation in which we were prepared to take a dilution. In 1964 American General was 95 per cent a life insurance company (in the sense that 95 per cent of our profits came from life insurance business). Life insurance stocks at that time were very popular and selling at a very high P/E ratio. Fire and casualty stocks were very depressed at the time, and yet we felt there were some very fundamental values in the fire and casualty business; we therefore made acquisition of a large fire and casualty company. We told our stockholders at the time that this, no doubt, would have a very bad effect on the market price of our stock but that we felt it would be good for the stockholders in the long run, even though there was a temporary dilution in earnings per share. This is all you can do, I think, with your shareholders when management reaches the decision that something is in the long-term interest of the company.

**MR. HAMPTON:** Management of a mutual company has a different problem. We would not be heckled by our policyowners, necessarily, but our agents certainly would do it if we do not keep our dividend up. We have wrestled with the problem, and it is certain that we are going to have to delay the return that we would get through the normal channels. The money that we are now investing in other subsidiaries is not going to be producing a return for some years. It will not be put in the regular portfolio and will not have an immediate return. As a result, we will have to think of other ways to keep our costs down and other ways of getting our production up in order to keep our net costs as low as possible.

It is well to remember, however, that we must wrestle with this kind of business decision every day. Our data-processing development expenditures represent a long-term payoff as opposed to an immediate payoff.

Some of these things you have to do for the long term. You cannot live on a year-to-year basis. You have to look farther down the road than that.

MR. MACGREGOR: I think it is more serious than that in a mutual company. A mutual life company has to think very seriously about expanding, or adventuring capital, really, for something that may bring profits in ten, twenty, or thirty years.

By reason of the heavy new taxation that just became effective, I consider it is also all the more important to us in Canada that we be careful about depressing earnings and dividends even further, through new ventures. Certainly the strain is serious enough if a company ventures into new foreign lands, even to do the same kind of business; but to get into other kinds of business altogether, especially those involving capital, requires very serious consideration.

MR. HAMPTON: Don't you face the same thing when you go into a new area with an agency? You know that you are going to be expending funds and that you will not have any payoff for some time.

MR. MACGREGOR: Quite.

MR. HAMPTON: One can look at this as the same kind of business judgment.

MR. MACGREGOR: In this situation I think you can plan better what the expenditure will be and what the strain will be, surely, than you can when expanding into a new kind of business, one with which you are not that familiar.

MR. LAKE: We will not knowingly go into either a new venture or a new product, for that matter, in the life insurance field without the hope of a satisfactory return on the invested capital. I suspect that everybody would have different figures. I would say that today, certainly, the expectation of a return in the realm of at least 15 per cent would be almost a minimum. We have for many, many years felt that we will not intentionally have any type of loss leader, and we apply this thinking not only to all the different companies but also to the different products in each company.

We vary our expected return in some circumstances; let us take the mutual funds as an example. We recognize that the funds are having given to them a field force that has been developed by Occidental. Now, in areas like this, we have not attempted to prorate the development costs of that



field force and charge them against the mutual fund. To that extent, some of the services that the company may receive would be a subsidy, but we do expect them to yield us a satisfactory rate of return.

MR. MACGREGOR: In Canada I think it is fair to say that in both stock and mutual companies the thinking of management has put policyholders first. If the stock companies in Canada take the holding company route with diversification into all sorts of lines, I think it is inevitable that the primary emphasis will shift from policyholders to the shareholders.

I do not know where that may lead, but it might well lead to some restrictions on stock companies to do only nonpar business. I do not know, in the case of a mutual company, how in the world you could create a corporate image when your primary thrust is toward such a diversified operation.

In our company we have a fundamental objective; that objective is to produce the best product with the lowest possible net cost. When, however, you are in all these other games, it strikes me that you are heading into a multifarious government operation, and I do not know whether government is the most efficient kind of operation to look to as a guide.

MR. LAKE: In Transamerica, we have never looked on ourselves as an arm of the government! On the question of policyholders' interests, we must come back to what type of enterprise you are going into and whether or not you expect to make each enterprise stand on its own feet.

I see no reason why our diversification should, in any way, affect our life insurance rates other than, hopefully, more favorably, by being able to combine certain types of operations like data processing and quite a number of common services. We look on the diversification as being an aid toward having lower ultimate costs to our policyholders, both nonparticipating and participating. We sell a fair amount of participating business, and we have to compete with both Mutual of Canada and Union Mutual, so we have to be able to show a decent return to our policyholders.

MR. HAMPTON: There are two points of view on almost everything. Actually, we do not look at this as any great change. We look at this as an evolution process that we, as an industry, are going through. In the late thirties we went into the health business. Nobody raised any eyebrows about it. We then went into the group business in the forties and into the pension business and now we are going into the equities business. In our current situation, as in the past, we are again leading from the insurance base that we have. In our opinion, we do not think this is very startling.

MR. DELANEY: It is my opinion that a mutual fund sale probably is going to be easier for our average run-of-the-mill life insurance salesman than is a variable annuity sale, but that is something for which there is no demonstration as yet. I do not think any company has had any conclusive results with its agency force in this area; only time will tell whether or not this is the case.

MR. HAMPTON: We intend to have wide public ownership of the stock of the downstream holding company, so that it may then acquire companies by giving out the stock. We intend, however, to be publicly selling stock of the downstream holding company in from two to four years. Certainly, when we do that, we will then have an additional vehicle to use in acquiring other companies.

I would like to ask Mr. Lake what factors led to the formation of Transamerica Life to operate in the same territories as Occidental but offering term products at lower rates than Occidental?

MR. LAKE: That is a good question. We spent a lot of time considering this before we went into it. We felt that it was somewhat like walking on eggs, because the last thing we wanted to do was inject a competitor into Occidental's life. We have enough of them.

To understand what prompted us to go this route, we have to go back in time to pick up a bit of history. We, as you probably all know, have been known to sell a little term insurance over the years. We once prided ourselves on being extremely flexible, and, if somebody wanted a particular term policy, we would design it. As we got bigger, we discovered we could not do a lot of things that we used to do before the age of computers. In addition, over the years the compensation system for our agents had grown quite complicated (with all of the convention qualifications, bonuses, and so on).

We formed Transamerica Life as a company that could do the things that we used to do when Occidental was smaller. Its main product is what we call a tailor-made term. It is designed to complement the products in Occidental's ratebook. We feel that it has been quite successful in this, as it gives us much more flexibility without gumming up all the procedures in Occidental.

CHAIRMAN ROBERTS: The diversification of life insurance companies results, generally, in the holding company being operated by life insurance people, and the pioneers are many-sided individuals. As things settle down and the life insurance company trains life insurance men and the

real estate company develops real estate experts, and so on, how do you develop men with the talents necessary to operate the diversified institution, particularly if it tries to integrate operations?

MR. LAKE: I have no answer as such, but we have recognized in Trans-america the need, of course, to develop good manpower. As a result, we have attempted in the whole family of companies to keep what I would call a personnel roster of all the key people in all the enterprises. We feel that the person is the important thing, not his area of experience. If a man has a great deal of ability, he can develop skills in the real estate field or finance or insurance or any other field. When someone needs a key man, he goes to this roster to determine who might be a logical candidate from one of the companies in the family. I should add that this system is still in the process of being developed. We have been working with it during the last year or two, and so far it has resulted in a number of good, sound transfers among the companies.

MR. HAMPTON: We believe that a manager is a manager, whether he is a life insurance manager or a real estate manager. We feel that he is transferable from one operation to another. This points up the opportunities that are available in this kind of complex.

CHAIRMAN ROBERTS: Are you implying in that comment, Colin, that there is another kind of management function over and above the life insurance management function for which people could be drawn from the life insurance operation?

MR. HAMPTON: No question about it. You get involved in things that are outside life insurance per se, and you must use management's abilities as opposed to specific technical abilities.

CHAIRMAN ROBERTS: Have any studies been completed which show the effects on agents' earnings of such diversification?

MR. DELANEY: The only areas in which we expect our diversification to improve our agents' earnings would be variable annuities and mutual funds, and I am not overoptimistic about the variable annuity side. Our other diversification moves were done purely from the stockholders' viewpoint on improvements in profits per share.

CHAIRMAN ROBERTS: How many officers and employees who are not officers or employees of the parent company does the Union Mutual have

in its several subsidiaries? In other words, can these subsidiaries operate in their respective areas independently of Union Mutual?

MR. HAMPTON: It is our intention that they will operate independently. They have separate boards of directors. Our Canadian subsidiary will be in operation on January 1, and it has its own set of officers. They are not associated in any way with Union Mutual, although their people came from Union Mutual. The person running Union Equity is independent of Union Mutual. When we acquired Community Life, it had its own staff.

CHAIRMAN ROBERTS: How does a mutual company handle policyholder equity when a policyholder lapses? As earnings are passed up to the Union Mutual, how do you distinguish between classes of policyholders?

MR. HAMPTON: We, by regulation, must keep a separate income statement and surplus statement for each of our lines of business. Earnings from the downstream holding company will be paid to Union Mutual in the form of dividends. In Union Mutual, the dividends are part of investment income and will be distributed to the various classes of policyholders along with all the rest of our investment income. We feel that delayed earnings from the downstream holding company, as a practical matter, will not cause us any serious problems in dealing equitably with our various classes of policyholders.

CHAIRMAN ROBERTS: Mr. Lake, regarding your approach of salaried personnel assisting the agent, does this contain the seeds of new agency compensation for life business? What would this do to the diversification program?

MR. LAKE: As of now, we see no indication that it should materially change the compensation pattern for our life agents. It is not a large enough factor for the salaried personnel to influence it. We feel that there are many developments that perhaps will and should change the pattern of agency compensation, and we have been studying this problem from stem to stern. I am not saying that we are about to change it, but we feel there are many factors indicating that it should be looked at.

CHAIRMAN ROBERTS: Why keep seven life companies and eight casualty companies instead of combining them into two large ones? Would not the centralization and overhead savings be worthwhile?

MR. DELANEY: There is no denying that there would be some economies from a complete centralization. Of the other hand, there are a number of good reasons for keeping the companies separate. First of all, there is the situation where the laws of a particular state restrict a company from operating in other states without imposing unacceptable limitations. As a good example, you might want a separate company operating only in New York State so as not to limit your activities in other states. Second, there is the question of regional identity. It is hard to measure the value of this, but we have found it to be an important factor. We have a company called the Hawaiian Life in Hawaii. It is the largest company in Hawaii, and Hawaiians serve as its directors. We feel this setup is very beneficial to its sales and its other operations. A third reason is that there are some very significant federal income tax and premium tax savings resulting from maintaining separate corporate entities.

We have an identical ratebook, however, for all companies and attempt to standardize underwriting, policy forms, and so forth. We get 90 per cent, perhaps, of the economies that we would get if we had all our operations under one corporation. Prudential, on a much larger scale, of course, has demonstrated the feasibility of regional operations. We basically operate with Houston as the central office and these companies as regional operations. We have only one actuarial department and one legal department, for example. We do get most of the economies.

CHAIRMAN ROBERTS: Mr. Hampton, one of the reasons for expanding into new areas has been said to be that of providing additional challenges for existing personnel, new worlds to conquer. Do I understand that this is somewhere in your thinking as a motivation for you?

MR. HAMPTON: This has been part of our thinking as well. We have felt that the image of the life insurance company, from the standpoint of attracting people, has not necessarily been as high as we would like it to be. When we talk in terms of a broader operation and the opportunity this affords, we think that we can change some of this. We have already experienced some flow of people from one company to another and greater interest on the part of people to know what is going on and to become involved in some of these things that we are doing.

MR. LAKE: Transamerica, having had a number of subsidiaries for many years, has recognized the need to maintain a balance in compensation at the higher executive levels. This extends through all the companies in the Transamerica family. This does not mean that all key managers are

paid exactly comparable salaries, but we do attempt to maintain consistency. Fringe benefits, stock option plans, and many of those incentives are on a company-wide basis. However, we have security analysts, for example, who are very much in demand, especially the good ones. There is a tendency in this field to develop incentive programs. This was recognized when our investment management company was formed, without automatically recognizing that we should have been doing the same in Occidental. Suddenly we found that some of the men in the new company were making virtually as much as our president, with the result that we have had to take a look at our whole compensation situation. I do feel, even though the process has been painful, that the net effect has been healthy, because it caused us to do something we probably should have done long ago.

MR. MACGREGOR: In Canada this is a problem but not because of diversification. Certainly in the investment field there are problems. These men are lured away by those who are going into business for themselves and by investment dealers. So far, however, most of the companies have been able to contend with this. I would think that, in the case of an organization diversifying, as have American General and Occidental, there would be compensation problems caused when people being absorbed have substantially higher salaries than those that are being paid in the acquiring organization.

MR. DELANEY: There are significant compensation problems in the area of security analysts, particularly in the mutual funds area. Young men who are in their early thirties or perhaps late twenties are running mutual funds and expect to be highly compensated; moreover, they can secure that higher compensation from someone else if you are not willing to provide it. In the data-processing area also there are great problems as to how you keep your young staff motivated when they can look next door and see somebody with no greater ability who is being paid a good deal more.

MR. MACGREGOR: In a mutual company that diversifies quickly, do you use the mutual philosophy, or do you head toward reconstitution as a joint stock company? Mention was made that stock of a downstream company could be offered to the public.

MR. HAMPTON: Union Mutual Life Insurance Company is a life insurance company. The downstream holding company is a stock company,

owned 100 per cent by a mutual company. I said that we plan to sell stock to the public in the future. Eight and a half million dollars are invested in the downstream holding company. Assuming that we were to sell an equal amount of shares, three or four years hence, we would anticipate that we would certainly get more than book value. If we did not, we would not do it. If we get the normal current market value for life insurance companies, we would get two or three times book value for these shares. This certainly would benefit the mutual policyholder. He would be getting two or three times his current investment.

**CHAIRMAN ROBERTS:** What type of insurance will Occidental sell in the United Kingdom, and what are the limits of entry? Can sales be made to citizens of those countries or only to Americans?

**MR. LAKE:** We anticipate selling much the same type of insurance that we sell here. There are great differences—for instance, in Australia there is a very great tax advantage to insured policyholders in the form of tax deductions for their insurance premiums. I think that this has been a factor in the insurance in force there being so heavily oriented toward endowment coverages. We feel that there is a real market for protection and ordinary life coverages, particularly for the great number of younger people. Our sales are coming along very well, with almost the same distribution that we have here.

Regarding the question of whom we can sell to, we certainly can sell to Australian policyholders. In the United Kingdom we will sell to British policyholders. Japan is one exception to this practice. We have been operating there for a number of years and can sell only to noncitizens. This appears to be on the verge of changing.

**CHAIRMAN ROBERTS:** If a downstream holding company is going to have public ownership, how will you avoid conflict-of-interest problems? This presumably is related to the conflict between the public stockholders and the policyholders who would also have a stake in the downstream holding company.

**MR. HAMPTON:** I cannot foresee where there would be any conflict of interest. We would expect that the Mutual Life Insurance Company would always own the majority of the stock of the downstream holding company. Can somebody help me out on what conflict of interest might arise?

MR. DAVID G. SCOTT: It seems to me that at some stage in the life of that publicly held company, the directors are going to have the problem of deciding whether they are going to favor the policyholders of the Union Mutual or favor the shareholders of the holding company.

MR. HAMPTON: The mutual company will always own the majority of the stock of the downstream holding company, and the board of directors will always have the ability to change the directors of the downstream holding company.

MR. SCOTT: May I say that I, as a shareholder in that company, will object. I would object if you considered me as a kind of second-class owner of the holding company. The conflict still exists.

MR. HAMPTON: There are many publicly owned companies where the majority of stock is held by others.

CHAIRMAN ROBERTS: Do you diversify through acquisition or diversify through building the new venture from scratch?

MR. HAMPTON: We are building, primarily because we do not have the vehicles through which to acquire. We have cash, but it is limited, as we have already mentioned. Most people are not interested in cash today; they are interested in other forms of capital.

MR. LAKE: We are primarily buyers rather than builders. The only exception to this is our leasing company. Our philosophy has been that it is good to avoid that long period of years where we do not have earnings. Even though we may take some earnings dilution at the time of acquisition, we feel that it will be less than would be the case if we were to attempt to build the operation from scratch.

MR. MACGREGOR: Speaking for a mutual company, we would primarily be builders and would not go into a line unless we felt that we knew a lot about it. Most of the organizations in Canada for sale likely would not provide any great bargain.

MR. LAKE: At this point we do not have an actuarial consulting operation, but we are giving serious thought to it, largely prompted by the fact that we have a number of companies in the group. We feel that it makes good sense to consolidate much of our product development work and that a separate organization would do that while permitting us to acquire additional clients outside the family of companies.



MR. DELANEY: We have no thought of going into the actuarial consulting business. We do not have enough actuaries now, and I do not know how we will find them.

CHAIRMAN ROBERTS: In the course of your thinking and activities to date, what potential hazards concern you? What constraints do you feel that you should observe as you pursue the objectives that you have described?

MR. HAMPTON: We do not feel that we are going too rapidly at all. In fact, what we have done to date is minuscule. However, in the short time that we have been involved in this, we can see that providing enough manpower will be our greatest problem. These activities provide additional opportunities for young people to make a contribution sooner than might otherwise be the case. At the same time, there is a great lack of understanding of what this change means. Change itself is disruptive, and this is a problem that we must manage.

MR. LAKE: I have already mentioned the squeeze on manpower. Our biggest single concern is from the standpoint of our field force, because, very frankly, we feel that it is our most valuable asset. We are concerned that we may give them such an array of products that it will add to much complexity to their daily lives. After all, they have had to absorb a great deal in the area of mutual funds and variable annuities. We hope that we are going into a period where we can stop to digest what we have already done. As I mentioned, our life sales are up very nicely, and, for that reason, I feel we have not gone too far. I do feel, however, that the biggest danger is moving too far too fast.

MR. DELANEY: The main problem would seem to be the manpower question. I would add that we are very careful to say to our field force that they are free to sell or not to sell any new product as they choose. We want to continue to sell life insurance, but we are trying to make available to them any other appropriate merchandise. We are very much aware that on occasion we have damaged a field man by diverting his attention from his primary life insurance sales thrust. This is perhaps the greatest single danger.



## TAXATION OF VARIABLE ANNUITIES AND MUTUAL FUNDS

1. From the viewpoint of taxation, what are the relative merits to the purchaser of nonqualified variable annuities and nonqualified mutual funds?
  - a) Characterization of differences in treatment.
  - b) Numerical studies of the differences.
  - c) What legislative proposals have been made?
  - d) What effect will the differences in treatment have on
    - (i) Marketing targets?
    - (ii) Product design?
    - (iii) Investment policy?
2. Review of taxation in Canada under present and new taxation laws.
3. How should companies treat the potential tax on unrealized capital gains on nonqualified variable annuities?
  - a) How are offsets in results between the general and separate accounts handled?
  - b) What effects are there on investment policy?
4. What are the considerations with respect to the potential tax on unrealized capital gains in a mutual fund?

MR. GEORGE T. MITCHELL: We are dealing here with the situation where no tax deferral is available as under the cover of a qualified pension or profit-sharing plan, H.R. 10 plan, or tax-sheltered annuity. For this non-qualified category, all investment gains are taxed in one form or another under both the variable annuity and the mutual fund. But the following questions are involved: Who pays the tax? When is the tax paid? What tax rate is applicable?

Let us look first at personal income tax. The variable annuity contract-holder is taxed on receipt of benefits on the same principles as a fixed-dollar annuity. Where there is a long-term payout, he spreads the return of his cost basis on the annuity principle. This is similar to the exclusion-ratio principle for fixed-dollar annuities. For the variable annuity an exclusion amount, rather than a ratio, is calculated to reflect the variation in the benefits.

All gains are treated as ordinary income. From the viewpoint of the contractholder's personal tax return, there are a tax deferral during his accumulation period and, if he does not surrender the contract, partial deferral through the payout period. It also implies payment of full tax rates on capital gains.

The mutual fund shareholder experiences very different treatment on

his personal tax return. Dividend income from nontax-exempt sources distributed by the fund is taxable on receipt as ordinary income. Capital gains *realized by the fund* are treated as long-term capital gains on the shareholder (regardless of how long he has held the shares). Unrealized capital gains achieved by the fund, and *realized to the shareholder by the sale of his shares*, are taxable as long-term or short-term capital gains, according to the period of time the shares were held.

Thus there is no tax break on dividend income, but capital gains receive capital gains treatment. There is a tax deferral on unrealized capital gains, provided neither the fund nor the shareholder realizes the gains. If a variable payout on the annuity principle is desired, the fund shares must be sold at retirement, forcing earlier realization of capital gains.

Let us look next at the taxation of the funding medium. Taxation of the mutual fund is usually quite simple—it passes through substantially all gains and pays no tax itself.

The variable annuity, however, is taxed as part of a life insurance company. Investment income in the separate account credited to contractholders' reserves is not taxed, but realized capital gains are taxable to the company, as are capital gains in the general account. Unrealized capital gains create a potential tax liability and the need for a reserve for future taxes. If there is no reserve and if the fund is turned over, the unit value will arbitrarily drop. Equity between generations of contractholders can be seriously disturbed if there is no reserve.

There is serious double taxation of realized capital gains. This already occurs on fixed-dollar annuities but is of little importance in general account. Unrealized capital gains will trigger a tax reserve holdback which exacerbates the problem. This double taxation will prove a major detriment to the contractholder.

In summary, the variable annuity is taxed at high rates but with heavy tax deferral. The mutual fund involves little tax deferral but favorable tax rates.

To make a valid comparison of taxation of a mutual fund and a variable annuity, we must assume that both mutual funds and variable annuities earn the same rates of investment income and realized and unrealized capital gains.

Some of the many variables relevant in making a comparison are:

1. Period of time involved
2. Single-premium versus accumulation plan
3. Calculation to be carried through retirement or proceeds to be surrendered

4. Tax rates on the individual
  - a) During the accumulation period
  - b) At retirement or surrender
  - c) After retirement
5. Level of earnings
  - a) Investment income
  - b) Unrealized capital gains
  - c) Realized capital gains

In almost all cases the mutual fund is better from the viewpoint of taxation for the surrendering investor. Generally, if the investor wishes to take a retirement income or withdrawal plan, the variable annuity will perform on almost the same level as the mutual fund, doing poorer in many cases and better in a few.

The following special situations occur: (1) a very high-income man might favor the tax deferral of the variable annuity; (2) a high-income and low-capital-gain situation favors variable annuities; and (3) a high tax rate now with a much lower tax rate on surrender or retirement favors the variable annuity.

MR. JAMES LEW: I merely wish to clarify some tax advantages of the mutual funds which may have been underestimated by Mr. Mitchell.

Mutual funds are taxed on the conduit theory—they are a media through which funds are distributed to the fund shareholders. All the taxable investment income of a mutual fund (except its long-term capital gains) is *distributable to its shareholders as dividends*, even though it may contain some bond interest. Long-term capital gain distributions, on the other hand, are really distributions of capital.

In calculating their federal income tax returns, individual investors are permitted to exclude \$100 of dividends a year (dividends include mutual fund distributions other than capital gain distributions). In the case of a joint return where the shares are held jointly, the dividend exclusion for the couple is \$200 a year.

With respect to capital gains distributions, while a life insurance company generally pays a 25 per cent tax (excluding surtax) on its net long-term capital gains, the mutual fund investor is taxed directly by adding to his other taxable income one-half of the amount of his net long-term capital gains, and the total income is subject to tax at the ordinary income tax rates applicable to the individual. However, the additional tax on account of capital gains can never be more than 25 per cent (excluding surtax) of his net long-term capital gains. Thus in both the above cases the

taxation of mutual fund distributions helps a taxpayer in the relatively lower-income tax brackets, particularly those who do not have other stock investments.

There is one additional comparison between the taxation of mutual funds and variable annuities which should be considered, namely, the tax status of the "beneficiary" of proceeds of a mutual fund and the death benefit of a variable annuity.

Upon the death of the mutual fund shareholder, the shares pass to the beneficiary free from any income tax. The replacement value of the mutual fund shares, that is, the asked price (which generally includes a commission), is included in the shareholder's gross estate. If the owner of a non-qualified *fixed* benefit annuity dies prior to commencement of annuity payments, the portion of the death benefit in excess of the consideration paid is taxable income to the beneficiary. If we relied on this precedent and on the speeches of Mr. Goodman, head of the Pension Division of IRS, we would assume that variable annuity death benefits would be treated in a manner similar to that used for the death benefits of fixed annuities. This, however, may not be true, since, on February 11, 1969, the IRS issued a private ruling that all such death benefits are free from income tax to the beneficiary, although the death benefit must be includable in the gross estate of the decedent. Unless this ruling is adhered to by IRS, and there is some question on this point, the mutual fund shareholder will have an additional and very valuable tax advantage.

MR. HAROLD G. WIEBKE: With respect to the comparison for the nonqualified market of the after-tax value of a deferred variable annuity and a mutual fund, we made a study earlier this year that showed a clear advantage to a "mutual fund approach." The mutual fund approach assumed that the shareholder would be able to cash in his mutual fund at retirement, pay capital gains tax on any previously untaxed gain, and apply the balance on a net basis to provide a variable immediate annuity. The study assumed identical charges and investment results (including rate of realization of capital gains) between the mutual fund and the annuity separate account. The mutual fund shareholder "buys in" to the separate account at retirement. A full reserve for unrealized capital gains was assumed held in the separate account.

Various tax brackets for the annuitant were considered. The only situation where the deferred variable annuity produced higher after-tax income was that of a very high tax bracket before retirement followed by a low tax bracket after retirement. This held for both single premium and annual premium cases.

MR. DANIEL F. CASE: I shall confine my remarks to the United States scene and, further, to the taxation of nonqualified variable annuities. While I have been told that the tax reform bill currently being discussed in Washington contains an item about the taxation of mutual funds—something technical concerning the use of a unit investment trust, I believe—I got the impression that I could safely ignore it for purposes of our discussion here.

In 1962 the life insurance associations sought legislation which would exclude from tax to the company capital gains under separate account contracts for qualified pension plans and under all variable annuity contracts. The effort failed insofar as nonqualified variable annuities were concerned, partly because of opposition from the mutual funds. Since then further efforts have been made by various parties from time to time to obtain a capital gains tax exclusion for nonqualified variable annuities. Those efforts have not been successful. Attention is now being given to other possible approaches, and I shall briefly describe three of them.

The first approach would eliminate the double taxation of capital gains by giving the mutual fund treatment to capital gains which are realized during the accumulation period and by exempting from tax at the company level capital gains which are realized during the payout period. By the way, when I speak of capital gains, I shall mean net long-term capital gains, in excess of net short-term capital losses, which are credited to the contract.

Under this first approach each account, separate or general, is treated separately. Investment income (as opposed to capital gains) is treated as it is under current law. When a capital gain is realized during the accumulation period, the company may distribute all or a portion of it to the contractowner. The owner pays tax on the distribution at his own long-term capital gains tax rate. If he chooses to leave the amount with the company, he still pays tax on the distribution but will not have to pay tax on that capital gain again.

If the company distributes none of the gain, or only a portion of it, the company pays tax on the undistributed portion at its own rate (25 per cent currently). It reports to the contractowner the amount of the undistributed capital gain. The contractowner pays tax on the undistributed portion, at his own tax rate, but receives a tax credit for the 25 per cent tax which was paid by the company. He also increases the basis of his contract by 75 per cent of the amount of the undistributed gain.

If the contract is surrendered during the accumulation period, investment income which has been credited to the contract is taxable to the owner as ordinary income. The difference between the remainder of the

surrender value and the basis of the contract is taxable as a long-term capital gain or loss.

As for the payout period, two alternatives are offered under this approach, the object of each being to exempt capital gains realized during the payout period from tax to the company. Under one alternative, at the time when a contract is transferred from the accumulation period to the payout period the basis of assets in the account is increased or decreased by the amount of unrealized capital appreciation or depreciation allocable to the reserves being transferred. From time to time thereafter the basis of the assets continues to be increased or decreased in the amount of the capital appreciation or depreciation (realized or unrealized) which has occurred. Hence there is no tax at the company level during the payout period. The gains are, of course, taxed to the annuitant, as he receives them, as ordinary income.

Under the other alternative within this first approach, capital gains realized during the payout period are simply declared exempt from tax at the company level. The amount of such gains is determined by an allocation of realized capital gains between nonqualified contracts in the payout period and all other contracts in the same separate account in proportion to the reserves under the respective contracts. As before, the annuitant pays income tax on the gains. Under this alternative, if assets are transferred from one account to another (separate or general), any unrealized appreciation or depreciation will be treated as a realized gain or loss at that time. This precludes unintended tax benefits arising from, say, the transfer of appreciated assets into an account where they will be allocable to contracts which are in the payout period.

That is the first approach, which is often called the "mutual fund" or the "pass-through" approach.

The second approach would eliminate the double taxation by taxing to the company any capital appreciation (realized or unrealized) occurring during the accumulation period and taxing to the annuitant any capital appreciation (realized or unrealized) occurring during the payout period. Investment income would be treated as it is under current law.

Under this approach, when a capital gain is realized during the accumulation period, the company pays a 25 per cent tax. There is no tax on unrealized capital appreciation at time of accrual during the accumulation period.

If a contract is surrendered during the accumulation period, the company pays a 25 per cent tax on any unrealized capital appreciation which has been credited to the contract. All appreciation which occurs to the point of surrender is, thus, taxed to the company. The contractowner pays



ordinary income tax on the excess of his surrender value over the adjusted cost basis of his contract. The adjusted cost basis is defined as (1) gross premiums plus (2) capital appreciation or depreciation allocated to his contract minus (3) capital gains taxes paid by the company in connection with his contract, including any tax for which the company becomes liable as a result of the surrender.

When a contract is transferred from the accumulation period to the payout period, the company pays a 25 per cent tax on unrealized capital appreciation which has been credited to the contract. This is the same thing that happens upon surrender. The contractowner adjusts the basis of the contract in the same way that I have described for surrenders. During the payout period the company pays no tax on capital appreciation. The annuitant pays tax on the annuity payments in the usual way, using as his tax basis the adjusted cost basis.

Under this approach realized capital gains would be allocated to non-qualified contracts in the accumulation and payout periods in the proportion which their reserves bore to the total reserves in the separate account. It would seem that under this approach, as under the "pass-through" approach, each amount (separate or general) would have to be treated separately for tax purposes.

The third approach would not eliminate the entire double taxation. It would treat capital gains realized during the accumulation period as they are treated under current law. It would exempt from taxation to the company capital gains realized during the payout period. It would accomplish this treatment of the payout period by either a periodic writing-up of the basis of assets or an allocation of realized capital gains between the payout period and the accumulation period.

MR. MITCHELL: My remarks are in answer to question 1, *d*, regarding the effect the difference in treatment will have on the following areas.

1. *Marketing targets?* The variable annuity will be aimed mainly toward the retirement savings market and in particular toward the immediate annuity market. The mutual fund will tend to be used for general purpose accumulation. Mutual fund withdrawal programs might receive less emphasis.

2. *Product design?* The disparate advantages and disadvantages of the mutual funds and variable annuity will lead to efforts to combine the best features in both; for example, (1) attachment of annuity purchase options or guarantees to mutual fund shares, (2) arrangements such as the investment annuities sponsored by First Investment Annuity Corporation, and (3) no load transfers within a mutual fund-variable annuity family.

3. *Investment policy?* On the surface it would appear that variable annuity funds might be invested heavily in high-yield stocks and that mutual funds might be more in growth stocks. This may prove to be too fine a distinction—many investors will look at the over-all potential of the stock and buy it if it is a “good” stock, not for any gimmicks or peculiarities. Presently there is great emphasis given on the distinction between income and growth mutual funds, particularly where elderly shareholders are concerned. This is chiefly due to the inadequacies of mutual fund withdrawal plans; that is, if the retired shareholder is not to dip into capital, he can depend only on investment income. Hence the desire for high-yield funds. A variable annuity gives him an opportunity to provide for a safe and orderly exhaustion of his capital. Therefore, there is no great need for distinct income and growth variable annuity funds. The variable annuity reflects the sum of dividends and capital gains.

CHAIRMAN WALTER N. MILLER: I understand that one of the companies in the variable annuity field discovered to its surprise that one of its most successful variable annuity products has been the single-premium deferred contract in the nonqualified area and that the key here was obviously that the tax-deferral aspects of the contract under the existing tax law had considerable appeal in the market place.

MR. HERBERT W. HICKMAN: These comments deal with the effect differences in tax treatment between nonqualified variable annuities and mutual funds have on product design.

In developing a nonqualified individual variable annuity, we at Prudential were concerned over the unfavorable tax treatment accorded the typical nonqualified variable annuity, particularly in cases where the annuity was surrendered during the accumulation period. A study of our lapse experience with fixed-dollar retirement annuities had shown that less than half the policyholders retained their annuities into the payout period. We recognized that a similar experience might occur with a variable annuity.

As you know, the man who buys the typical nonqualified variable annuity and who subsequently surrenders it may take a terrific beating on taxes. The effect is the same as if he had paid a capital gains tax at the corporate level of rates on both realized and unrealized capital gains in the separate account, for which he receives no tax credit or adjustment in basis. In addition, he pays tax at current income rates on any gains he realizes on his investment. If, instead, he had purchased a mutual fund, he would only be taxed upon the dividend and capital gains distributions,

with an adjustment in basis if the distributions were reinvested and often with the use of the \$100 dividend exclusion. At surrender, he would be taxed upon any realized capital gains at his personal capital gains tax rate.

Even for policyholders who retain their annuities into the payout period, we found that the net results would generally have been better had they qualified for mutual fund taxation during accumulation and typical annuity tax treatment during payout, even if the conversion from accumulation to payout gave rise to the realization of capital gains. This did not hold true for individuals in a very high tax bracket during the accumulation, who subsequently are in a low bracket during the payout; but it was true for the vast majority in the market which Prudential serves.

As a result, we designed our nonqualified variable annuity product so as to be eligible for taxation as a regulated investment company during the accumulation period by separating the accumulation and payout provisions of the annuity into two contracts and by using two separate accounts. Both separate accounts are invested in shares of the same underlying mutual fund. During the accumulation period, annual dividend and capital gains distributions are made. The annuity rate guarantee provisions for the accumulation period are in a third contract in the form of annuity rate protection rights; each purchase during the accumulation period also includes the purchase of these annuity rate protection rights. These three contracts are always issued together as a combined program and in combination provide a deferred variable annuity.

The separate account holding the accumulation funds is thus taxed as a separate entity apart from the insurance company. When a planholder retires and enters the payout period, funds are transferred from one separate account to the other, and it is our understanding that a taxable event occurs for the planholder.

I feel that there is a great potential for new variable annuity developments that can be of substantial benefit to the public. Prudential has made one step in this direction; I am sure that other companies will develop other innovations. This is a very new field, with a lot of unexplored territory.

MR. ROBERT C. DOWSETT: For unregistered mutual funds in Canada, taxation is simple now. Investment income flowed through as dividends is taxed at personal income tax rates in the hands of shareholders who normally can claim a tax credit of 20 per cent of such dividends. The fund itself pays no income tax on dividend income and only

23 per cent on interest income. Capital gains, realized and unrealized, are not taxed at all.

For variable annuities and regular deferred annuities, the tax status prior to the 1969 passage of Bill C. 191 was as follows. During the accumulation period, no tax was paid by the policyholder or by the company; in general terms, on surrender, the entire excess of maturity value over sum of premiums was taxable at regular income tax rates. On vesting of a deferred annuity (variable or fixed dollar), however, the entire growth to that date escaped tax, and the maturity value was used as the "investment in contract" to find the tax-free portion of annuity payments. All earnings after vesting were effectively taxed to the annuitant at personal income tax rates.

In the spring of 1969, the federal government passed Bill C. 191, imposing (1) a heavier corporate tax on insurance company business income (previously there had been no federal income tax on mutual companies and little on stock companies), and (2) an investment income tax (at 15 per cent on the interest earnings, less some deductions) involved in most life company products. This latter tax is really a tax on the policyholders on their so-called inside build-up in cash values, and so forth, but this tax, in connection with fixed-dollar life company products, is paid in bulk by the company on behalf of the policyholders instead of individually by the policyholders themselves.

However, in connection with all variable annuities and variable insurance products, with benefits linked directly to the performance of segregated fund assets, the insurance industry asked for and got special treatment under Bill C. 191. We argued that the tax treatment of the equity-linked savings elements of these policies should be the same as the tax treatment given to mutual funds.

The result is that, starting in 1970, for unregistered policies, the net investment income earned by a segregated fund each year is allocated for tax purposes to the various policyholders whose policies benefit from that investment income, whether or not there is any distribution of actual earnings to the policyholders. This amounts to "flow-through" taxation, and the company pays no investment income tax.

Further, if the investment income earned by the segregated fund is in the form of dividends paid by taxable Canadian corporations to the fund, the policyholder gets a tax credit equal to 20 per cent of the allocation from the segregated fund that he must take into his taxable income.

As we still have no capital gains tax in Canada, both unregistered mutual fund holders and unregistered variable annuity policyholders can enjoy tax-free growth in their contracts resulting from capital gains. There

is an interesting contrast here—in the United States we have a tax on capital gains and no direct tax on the interest build-up of life company products, while in Canada we have as yet no capital gains tax, but we do have a direct tax on the interest build-up.

An unregistered variable annuity after vesting still calls for yearly allocation of some investment income to be taken into the annuitant's taxable income, in most cases with a 20 per cent tax credit. We are still negotiating with the government officials in connection with a technique for leveling out the tax-free portion of annuity payments in a fashion similar to that available in both Canada and the United States for fixed-dollar vested annuities.

In Canada, a great variety of life company products has been developed recently combining life insurance benefits and savings elements tied directly to segregated fund investment performance. A growing number of companies have products which are basically annual premium variable annuities plus reducing term insurance built into one contract.

Some companies have introduced special dividend options under which the dividends declared under regular fixed-dollar participating contracts are automatically used to purchase units of a segregated fund.

Bill C. 191 was written in such a way as to tax the investment income allocations of the segregated fund elements of these policies in the hands of the policyholder in the same manner as mutual funds are taxed, while taxing the fixed-dollar elements in the manner of other normal fixed-dollar life company products (on which the company pays 15 per cent of "inside build-up" on behalf of the policyholder). Some contracts have been written in such a way as to call for amounts earned in the segregated fund to be transferred to the general funds of the company to purchase extra fixed-dollar benefits, and Bill C. 191 is detailed enough to handle properly the policyholder and company tax aspects of this sort of complication.

Generally speaking, for registered contracts in Canada—both mutual funds and variable annuities—policyholder deposits thereto are deductible from taxable income and the entire growth is tax-free up to the time of payout, but all benefit payments are subject to full income tax rates in the hands of the recipients.

On November 9, 1969, the Canadian government presented a long-heralded white paper outlining government proposals for tax reform to be worked up into legislation hopefully within a year. The white paper proposes a capital gains tax for Canadians and, if this comes to be the law of the land, of course, the treatment of mutual funds and variable annuities will again be altered. I believe, however, that it is fair to anticipate that the capital gains tax would be paid by the holders of unregistered variable

annuities in much the same way as it would be paid by the holders of unregistered mutual funds; for the latter, the white paper proposes the use of special capital gains distributions with special tax rates.

For normal capital gains, the white paper proposes that 50 per cent of the capital gains on shares of widely held Canadian companies be taken into taxable income and that 50 per cent of capital losses be allowed as deductions. Capital gains and losses on other assets would be fully includable in taxable income. Gains would be reckoned from some valuation date to be set by the government, supposedly during 1970. Further, for widely held Canadian companies, share holdings would be revalued at market value every five years, and one-half of the resulting gain or loss would be taken into taxable income for that year—a kind of forced realization of capital gains.

Other proposals brought out in the white paper are the following:

1. Treat closely held corporations like partnerships—in effect, treating federal income tax paid by such corporations as a prepayment of the personal income tax on behalf of individual resident shareholders.
2. Raise to 50 per cent the existing 21 per cent tax on the first \$35,000 of annual company profits.
3. Raise personal exemptions substantially, resulting in the removal of approximately 11 per cent of the taxpayers from the income tax rolls and the reduction of taxes for another 45 per cent of the taxpayers at lower income levels.
4. Reduce top personal income tax rate from 80 to 50 per cent.
5. Increase rates of income tax at lower end of scale.
6. Increase taxes on income for those earning approximately \$10,000–\$25,000 annually. (Lower income taxes charged to high-income earners offset by imposition of capital gains tax which will be mainly felt by those high-income earners.)

All the white paper proposals are just proposals at this point, and they may be modified markedly before any legislation is actually worked up and presented to Parliament for action there.

MR. MITCHELL: Do you have any problems reporting all these taxable events to the insurance policyholders and annuity contractholders?

MR. DOWSETT: Yes, we have problems which we have not properly faced yet, because we do not have to report the “flow-through” taxation on segregated fund contracts until January 1, 1970. While this new income tax law is effective for 1969, we got a one-year deferment on the “flow-through” and some other elements of the tax. We have quite a number of variable contracts of one form or another sold and in force, and we asked

for this "flow-through" type of taxation for them; so, we will have to figure out a way to report it!

MR. HENRY B. RAMSEY, JR.: The 20 per cent tax credit is available in connection with certain dividends. Is the proportion of the "flow-through" which would qualify for this very high?

MR. DOWSETT: Yes, I expect it to be close to 100 per cent. Most of the segregated funds that companies have are invested heavily in the shares of taxable Canadian corporations, and the 20 per cent tax credit is there for "flow-through" taxable amounts arising from the dividends on these shares.

MR. ALLAN K. ARCHER: Would you agree that the white paper at this stage is merely handwriting on the wall and that we do not really know what the final laws will look like?

MR. DOWSETT: Oh, yes, very definitely. The white paper has been published, outlining in general form the government plans, but it is just a white paper. It is not even proposed legislation now. All these measures dealing with capital gains and revised income tax rates and exemptions, as set forth in the white paper, must be debated; it may be a year before any of it gets into legislation, and what might get into legislation may be drastically modified.

MR. JOHN C. FRASER: The capital gains tax on nontax-qualified variable annuities and on the surplus under tax-qualified variable annuities gives rise to one of the most difficult problems that I have ever encountered.

The problem exists at three different levels. The first is the allocation of realized capital gains and losses between amounts that receive exemption from the capital gains tax (i.e., qualified pension reserves) and amounts that do not receive such an exemption (i.e., surplus and nonqualified reserves). In a qualified separate account this involves a separation between surplus and tax-qualified reserves. In a nonqualified separate account this does not represent a problem. In a separate account mixing both qualified and nonqualified moneys or in a situation where separate qualified and nonqualified accounts are investing in a common companion fund, this is a problem also.

After the allocation of realized capital gains and losses between tax-exempt amounts and nontax-exempt amounts has been determined, there

is a second problem of how to deal with the fact that the company is treated as a single entity for capital gains tax purposes so that capital loss carryovers from, say, the general account may offset realized capital gains in one or more of the separate accounts.

After the amount of realized capital gains allocated to tax-exempt and to nontax-exempt amounts and the amount of capital gains tax to be paid by each separate account and by the general account are determined, there remains a third problem of how to provide for the potential tax on unrealized capital gains in connection with nontax-qualified variable annuities.

Before discussing these three problems, I would like to point out a few basic principles.

We must begin by recognizing the fact that it is possible to have realized gains in excess of the unrealized gains just prior to realization. It is also possible to have realized losses in excess of unrealized losses, to have realized losses when there are unrealized gains, or to have realized gains when there are unrealized losses. The reason for this is that the unrealized appreciation or depreciation in a common stock portfolio represents the combined effect of many different stock issues having market values at different levels relative to their costs. For example, some stocks may have a market value above cost, and some may have a market value below cost, the net effect in total being an unrealized gain or an unrealized loss. Depending on which stocks are sold, there may be either a realized gain or a realized loss.

This situation can create difficulties in attempting to solve our first problem of allocating realized gains between accounts sharing the same investment experience or between the reserves and surplus of a tax-qualified separate account. Perhaps the most extreme example is one in which all accounts are in a zero unrealized capital gains position and then a gain is realized by the sale of a stock issue which is selling above cost. In this situation it is clearly impossible to allocate the realized gains in proportion to the unrealized appreciation just prior to realization, so that it will be necessary to use some other basis.

One way to get around this is to allocate the realized gains in proportion to the amount of money in each account. This, however, gives rise to still another problem. Consider a situation where the first account amounts to \$150,000, including a \$50,000 net unrealized gain, and the second account also amounts to \$150,000 but contains no net unrealized gain. Remember that we are talking about pooled money. If we realize the entire \$50,000 capital gain by selling all the stock in the pooled fund and allocate it in



proportion to the amount in each account, we should allocate 50 per cent, or \$25,000, to each, which gives too little to the first account and too much to the second. Thus this method can also run into difficulties.

One company has made a brave attempt to solve the problem by separating the stocks selling above cost from those selling below cost and by allocating the gross gains and the gross losses separately to each account. The trouble with this, in addition to its being a lot of work, is that a stock can run up while 60 per cent is being allocated to a given account and can run back down while only 40 per cent is being allocated to that account because of growth in the other accounts. This produces a net allocation to the account of a gain on a stock that is actually selling at cost.

Thus it appears that there is no single correct way to allocate realized capital gains and losses between accounts. It makes one wonder what the tax law means when it says that realized capital gains in a separate account are exempt to the extent that they are reflected in qualified pension plan reserves. The Treasury has ducked the question in its tax regulations and is wisely waiting for the companies to make the first move.

My company has decided to allocate realized capital gains and losses in proportion to the amount in each account at the time of realization. We are doing this for three reasons. First, it is simple. Second, it is consistent with the method of allocating dividends on stocks. And, third, we are planning to have both our tax-qualified separate account and our nontax-qualified separate account invest in the same companion fund, so that we probably will be required to use a method consistent with the per share method used by a mutual fund, which our method is.

This brings us to the second problem of how to handle capital loss offsets where the tax loss carryovers from some accounts to the other accounts are resulting in the company's paying less tax than it would if each account were taxed separately. I understand that companies are currently having considerable difficulties with the SEC because of this.

In my discussion of this subject at the New York City Regional Meeting this spring (a discussion which appears on pp. D56-D67 of the 1969 *Transactions*) this problem was dealt with at great length. I do not, therefore, propose to do more than summarize it here. I pointed out there are at least three different methods of making the allocation of capital gains tax between the general account and the separate accounts.

The first is to charge each account with a capital gains tax as soon as it realizes a gain or to credit it with a capital gains tax offset as soon as it realizes a loss. This method involves the use of a "holding" account,

probably the general account, that is credited with the taxes being deferred because of the capital loss carryovers of some accounts being available to offset the realized capital gains of the other accounts.

The second method is to charge each account with a capital gains tax or to credit it with a tax offset only at the time the company actually pays a capital gains tax but at that time to make a complete transfer of all outstanding taxes or tax credits. This method also involves a "holding" account.

The third method is to make no transfers between accounts but to prorate the tax actually paid in proportion to the amounts owed by each account. This method has the effect of making each account pay all its taxes only when all accounts, including the general account, are out of a tax loss carryover position. This method does not involve a "holding" account.

It is my understanding that the SEC is objecting to the first method and might very well object to the second, on the grounds that the company has charged the separate account for taxes that the company has not actually paid. It is my feeling that the third method would overcome this problem, but it has not yet been tested with the SEC. My company plans to use this third method and therefore will be finding out whether the SEC will accept it.

With regard to the third problem, it appears that the SEC is requiring that a capital gains tax reserve for the potential capital gains tax on all unrealized capital gains in connection with nontax-qualified variable annuities be held at the full present 25 per cent capital gains tax rate. In principle there appears to be no objection to holding such a reserve, since it is the only way to isolate unit values from the investment activity within the separate account. If it were not for such a reserve, a separate account with a rapid turnover of its investments would have lower unit values than one that was not rapidly turning over its investments. The price that is paid, of course, for such a reserve is that only 75 per cent of total capital gains and losses can be reflected in the unit values for a nontax-qualified variable annuity.

If such a reserve is held, it appears to make sense not to adjust it for the investment performance of the funds backing it. In other words, any interest or capital gains on the tax reserve can be allocated back to the other portions of the account and thus used to "sweeten" unit values, as it were.

One interesting problem arises when a negative tax reserve is created. A negative tax reserve occurs if 25 per cent of the total capital gains to date less the capital gains tax actually paid from the account since its inception

is negative. This can happen in two ways. First, it can occur at the outset of operations in the case of a market decline immediately following entry into the field. Second, a negative tax reserve can occur if the company follows a policy of selling the stocks that have risen in value and retaining the stocks that have not. Thus realized capital gains may exceed total net capital gains, and a negative tax reserve can occur. It is hoped that the insurance departments will recognize a negative tax reserve as a legitimate reduction in liability and will not require additional funds to be transferred from the general account.

Finally, it is clear that the use of a capital gains tax reserve leaves the investment department free to follow whatever investment policy it feels is appropriate with regard to turnover of the stock portfolio, since it has no effect upon unit values. It is also clear that, if there is no such tax reserve, the realization of capital gains or losses will have a financial effect on the contractholder, just as it does in the case of mutual fund share values. In such a case it might be necessary for the investment department to consider the effect on unit values when it decides which stocks to sell and when to sell them.

**MR. HARRY WALKER:** I would like to speak on behalf of a company that did file with the SEC about six months ago for a nonqualified separate account and does not as yet have clearance.

I did appear before the staff of the SEC to discuss the question of taxes on capital gains on the nonqualified account and made a rather elaborate presentation. We have not had a final reaction from the SEC.

But there are certain principles that we established in our presentation. First, we believe the reserve for capital gains should be held by the company. It is our understanding that the SEC wants such a reserve; but, whether they want it or not, we believe it is the right thing to do. Second, we believe that the treatment of the capital gains tax between accounts, where a separate account has a gain and the general account or some other separate account has a loss, should be such as to avoid sudden changes in the unit values, depending upon whether an unrealized gain is realized, and we expressed the view that a translation of unrealized gain into a realized gain should not in itself affect unit values. Third, we expressed the view that the investment people in a life insurance company should not be influenced in their actions by the tax effects of the timing of the realization of capital gains or losses.

With those three principles in mind, we concluded that, when there is a gain in one account (for example, account 1), and a loss in account 2, in a given calendar year, account 1 should be charged (assuming a 25 per cent

tax) with 25 per cent of the realized gain and account 2 should be credited with 25 per cent of the loss carryover that it loses as a result of its loss being used as an offset to the gain in account 1.

We presented a rather elaborate table showing that under this procedure we would avoid violent changes in unit values. We also had in mind that with this procedure the investment people would have their hands free as to the timing of the taking of the gain or loss.

**CHAIRMAN MILLER:** It is certainly important for all of us to remember that this tax reserve is not merely something that the SEC is trying to foist on insurance companies; as Harry has indicated, there are important considerations involved, and a very strong case indeed can be made for the existence of this reserve from the standpoint of equity and other matters, quite apart from what the SEC attitude might be.

**MR. MITCHELL:** The concern with respect to the potential tax on unrealized capital gains in a mutual fund is in "buying a tax liability." If a mutual fund realizes gains on securities held longer than six months, it will generally make a capital gains distribution to its shareholders. These distributions are taxable to the shareholder as long-term capital gains, regardless of how long he has held the mutual fund shares. A new shareholder might instantly acquire a tax bill through a capital gains distribution, which is only a partial return of capital from his viewpoint.

This is "negative tax deferral." Capital gains are paid now in return for a smaller taxable capital gain in the future, because the value of the mutual fund shares is reduced by the amount of the distribution. Consider the following example:

1. A man purchases \$10,000 of shares in a no-load fund.
2. A capital gains distribution of \$4,000 is made the following day.
3. The man has a taxable realized long-term capital gain of \$4,000.
4. The value of his shares is reduced to \$6,000.
5. He sells the shares later for \$6,000.
6. He now has a realized capital loss of \$4,000.

## CORPORATE PLANNING

1. What are the essential ingredients of successful corporate planning?
2. How have companies organized to conduct corporate planning activities?
  - a) Organization structure.
  - b) Manpower requirements.
  - c) Use of outside consultants.
  - d) Role of the actuary.
3. How much and what kind of research are needed to support corporate planning in an insurance company?
  - a) Staffing and organization of the research function.
  - b) Use of research conducted outside the company or industry.
4. To what extent have management science methods, such as corporate modeling, simulation, mathematical programming, and the like, been used for corporate planning?

MR. CHANDLER L. MCKELVEY: Few of us work for a company that has truly successful corporate planning. The basic reason for this is that planning is a very hard thing to do. It requires thinking, and people do not like to do that too much, and it requires thinking about the future, which is even more difficult.

The easiest way to get to the essential ingredients of successful corporate planning is to ask a few questions, and, if the answers to all these questions are in the affirmative, you do have the essential ingredients of successful corporate planning in your company.

The first question is "Is your corporate purpose clearly known, articulated, and widely communicated within the organization?" In other words, are objectives and goals widely known? This does not refer to platitudes about providing the most effective service to the largest number of customers or growing as rapidly as possible consistent with a reasonable profit, or the like, but the reasons for being in business.

The second question is "Does your company have a realistic understanding of the current situation?" By current situation I mean your corporate position in the industry and the industry situation. Things change; what was true yesterday is not necessarily true today.

A good example comes from the automobile insurance business. It could be argued fairly persuasively that this industry is in an antisocial stance at this point. The recognition of that, the acceptance of it, and the recognition of the need for fundamental reform are essential to making reasonable and good plans, if you happen to be in the automobile insurance business.

A third question is "Do you have realistic and articulated predictions of major changes or trends for the medium-range future?" An example comes from the health insurance business. A realistic appraisal of the future of health insurance will have a significant effect on planning and the effectiveness of your planning.

My fourth question is "Do you have your chief executive officer's enthusiastic interest and his direct participation in the planning process?" You must have his full support and participation; if not, you will fail.

The fifth question is "Does the planning concept have general acceptance within your organization?" Planning implies co-ordination. Do your departments really accept co-ordination?

Many of us work for companies that have group departments and ordinary life departments. Do they really accept the idea of planning? Together? Or do they plan separately or have unco-ordinated activities? If so, they work against each other.

My sixth and last question is "Do you have the resources to get the job done—staff, equipment, time, budget?" This is one area which, if half-financed, will not get half-done. You cannot sneak into this business—you must have what you need to get the job done.

If you can answer all those questions with yes, you have all the essential ingredients.

Before closing, I would like to give two items of advice to those who are getting into corporate planning or who are interested in planning. First, the most difficult part of your job can be sales, that is, selling the idea of planning to management. Plan in this respect as if you are making a large sale. Do not underestimate how difficult this sale is. And, second, start slow! Bite off something that is smaller than you can chew. It will turn out to be more difficult than you think.

**MR. W. JAMES MACGINNITIE:** The first thing that must be considered with regard to organization is the kind of planning system you wish to have in your company.

There is an old saw in the planning business that "structure follows strategy"; you have to decide what it is that you are trying to get done before you organize to get it done. In particular, there are many decisions about the scope of the planning system—whether it is to cover financial areas only; whether it is to cover marketing; the organization structure of the company; how far in the future; what level of detail; and so forth. All these questions have to be considered before you decide on the organizational structure for your corporate-planning operation.

It is important that your planning organization and responsibility for planning be fixed at a very high level and for the planners to have access to the chief executive officer. In our own case, at the CNA Financial, the vice-president of corporate development reports to the chief staff officer and meets regularly with the chief executive officer of the company.

The planner should also have good access to all areas of the company, particularly if your planning system is an all-encompassing one, because the planners are going to need a great deal of information and they are going to need to know how to get it quickly and accurately without a great deal of bureaucratic red tape.

Many companies have something called the "planning committee," and the structure of that committee is an interesting phenomenon, particularly the question of whether that committee should contain line executives or not. The problem with the line executive is that he tends to represent the vested interests of that function for which he is directly responsible. In many cases he finds it difficult to engage in a give-and-take atmosphere that represents the entire corporation rather than the piece for which he is responsible. Nevertheless, he is probably the best man in terms of communication with that particular part of the organization, and you need that communication. To make possible the implementation of your plan is a good argument for having him on the planning committee.

The relationship of your planning organization to the control function, I think, is also an important question. A good plan obviously has controls built in and shows at the end what the results are going to be and how they are going to be measured. Someone then has to apply the yardstick, and the relationship of the planner to the "controller" presents some interesting problems. In our company it is by and large the chief executive officer who applies the yardstick. We have tried to keep the planners out of that operation. There are other companies in which, very successfully, the planners are also the "controllers."

Another aspect of the organization-structure problem is the internal operations of the planning department. In our own case and in most successful operations of which I am aware, it has been found necessary to manage the planning department on a project-system basis. This is true because almost all the work in the department is on a one-of-a-kind project and because a given individual may be involved, and most likely is involved, in more than one project at one time. In many cases, he will be the leader on one project and a participant in a group on another.

Turning next to the manpower requirements, we should go back to the question of the kind of planning system you want.

Another relevant factor is the planning load that will be carried by the key executives of the organization.

A third factor is the existing manpower outside planning and the extent to which they can be called upon for work on task forces and special assignments and for the production of figures and studies as part of their regular operation. In our own case, we used task forces extensively during the early start-up phases of the planning operation. It was therefore unnecessary to recruit a great deal of manpower into the planning department immediately.

Another relevant factor is the information requirements of your planning system. Those of you who have worked with planning systems know that they devour a great deal of information. They require hard data which are very often difficult to come by. You have to assess exactly what it is that is going to be required and the amount of work that is going to be required to develop that information.

The size of the department can vary. I have heard some people defend the one-man planning department, and they have done it quite eloquently. This is in an organization where planning is an integral part of the management system, and the one-man planning department is involved almost solely in expediting, ensuring consistency of format, and so on.

On the other extreme, there is a seventy-man department, which includes a large operations-research function. The size of that department, however, did not appear to have assured success of the corporation.

In our own case, we have about ten professionals in the holding company corporate development department, which, as the name implies, covers more than planning. It covers development and acquisition studies and a great deal of co-ordination of the acquisitions that have been made to date.

The kinds of people that you might consider adding to the planning staff include a man who is skilled in planning systems—someone who knows the kind of format called for, how to flow-chart the planning system, and things of that nature. A marketing expert, financial analyst, actuary, economist, people skilled in systems and information technology and in operations research are all relevant too.

There are five qualities on which we evaluate our planning people. They may help to put the question of manpower requirements in greater perspective: (1) planning skills; (2) strategic perception, that is, the ability to cut through and find out what is relevant to the problem; (3) knowledge of the industry; (4) communications skills, including eliciting information as well as transmitting it; and (5) persuasiveness.

On the question of outside consultants, I would refer to the fact that



planning is part of management's job and it cannot really be delegated or contracted out. There are consultants who would be happy to collect your money. Some of them will apply a cookbook, and that is one of the most dangerous things you can do in planning. Others will help you build your own system, and that is the way it ought to be.

The actuary's role is a difficult one to discuss here. This depends on the type of planning system you want and the type of actuaries you have. By and large, an actuary will have a good understanding of the over-all operation and should therefore be fairly good at the strategic-perception quality just mentioned. Beyond that, it is an individual situation.

**MR. HOWARD H. HENNINGTON:** Corporate planning and research are so closely entwined that it is very difficult to separate the two. Professor E. Kirby Warren, of Columbia University, in his valuable book *Long-Range Planning* defines corporate planning as "a process directed toward making today's decisions with tomorrow in mind and a means of preparing for future decisions so that they may be made rapidly, economically, and with as little disruption to the business as possible." In a broad sense, any research designed toward understanding current operations and understanding the future environment is clearly of help in making today's decisions with tomorrow in mind and in preparing for future decisions.

The first step to corporate planning involves a determination of a company's purpose, goals, and objectives. If these goals are set out in some detail in clear terms, they will form the cornerstone for appraising possible actions and assessing results. At Equitable there was developed a book known as *The President's Long Range Plans*. Department heads and other officers have a copy of this book, which is constantly kept up to date. The book starts with a statement of purpose and goals and continues with information on a variety of topics, such as the following:

1. External growth indicators. This includes forecasts of gross national product, disposition of personal income, consumer price index, and population changes.
2. Organization.
3. Corporate citizenship.
4. Research and development.
5. Administrative personnel.
6. Office space.
7. Cost control.
8. Financial results.
9. Agency field force.

10. Individual sections for each line of insurance business and each investment classification. The section for each line of business states specific objectives for each line and gives operating results for the line as well as for leading competitors. In each case are also stated objectives year by year for such growth indicators as volume of business in force, new business, premium income, and so forth.

The maintenance of the plans book provides regular opportunity for reappraisal of objectives and for comparison of results with plan objectives.

In addition to research on the economic environment, a good deal of research is needed in order to assess the impact on expected results of present decisions. There is clearly a large area of market research determining agent retention and agent production according to agent experience. This research can obviously be refined to varying degrees in order to make projections more meaningful.

Research is also needed to understand the significance of some of the basic ingredients of our business. If one succeeds in corporate planning in projecting expenses, expense ratios, and operating statements, the next step is careful examination to appraise what performance is considered acceptable. One comes face to face with the limitations of life insurance company annual statement results. Planning forces a participation of individuals from all specialties in the insurance company and forces all disciplines to deal with such matters as net gains from operations, company surplus, and expense ratios. It is important for the actuary and others concerned with long-range planning to perfect these measures and to make them useful. As an example, we must consider adjusted-earnings approaches for amortizing acquisition expenses which might appropriately be capitalized. Even though some of these refinements might not be appropriate for annual statements, such refinements will often be helpful in assessing the figures needed for determining long-range plans.

The question in our meeting program refers specifically to the organization of the research function and the use of research conducted outside the company. The research organization can be located either centrally on the staff of the chief executive or in several functional departments. In any event a competent researcher will use research conducted outside the company and outside the industry.

Planning and research in our company are done throughout the organization under the active stimulation of the chief executive. As an example, our group operations officers are meeting in a few days to reassess their ideas on goals and objectives. Background material was sent out in advance of the meeting. Reactions are being collected at the present

time, and they will be summarized before the meeting. Participation in planning by line executives is essential to effective planning.

**CHAIRMAN WILLIAM H. SCHMIDT:** To what extent have management-science methods, such as corporate modeling, simulation, mathematical programming, and the like, been used for corporate planning?

**MR. McKELVEY:** One of the simpler, and still most effective, management-science tools is an agency force simulation model. Such a model can help sales management in the area of marketing opportunities. It can help line management struggle with problems like the expenses and production that are going to be associated with different kinds of growth patterns of the sales force. It will also provide a useful tool for determining the financial results based upon different strategies.

Something along this line can give you a success or two and enable you to move out to more advanced things.

**MR. MacGINNITIE:** I alluded earlier to the strategic-planning process at CNA Financial in its early days. At that time we did do a computerized financial model of the company. It was pretty crude. It was really just a set of accounting tautologies. There was nothing in it that introduced external environmental influences. It required a great deal of input that had to be developed independently, and it prepared a consolidated income, statement and balance sheet from figures based on those data. Now we are currently looking at a redo of that model to include some environmental influences.

Another problem with which we are wrestling is the resource-allocation problem of a holding company that owns, among other things, a casualty company, a life company, a finance company, and a home-builder of large size. We face the problem of allocating our resources among these various enterprises, and we find that the existing accounting techniques that are used by these enterprises do not provide us with adequate information to make those decisions.

So, we are engaged in an attempt to develop a method of comparing returns on our investment which recognizes the different cash flows and different returns that are available. We are also trying to correct some of the biases in the various accounting systems.

**MR. ALDEN W. BROSSEAU:** Some people think that the job of the chief executive is corporate planning. Do any members of the panel think that in an organization where there is a planning department there is a

risk that the corporate executive's chief job is delegated or perhaps relegated too far from his central attention?

MR. MCKELVEY: Yes, there is a danger. Probably a majority of chief executive officers reached their current positions not because of planning ability but because of other aptitudes. I think a significant number of chief executives are inclined to be intuitive managers. So there is always the risk that, if you do move this function away from them, they can breathe a sigh of relief and say, "Well, I don't have to worry about that any more. Somebody else is taking care of it!"

MR. MACGINNITIE: I would agree with Mr. McKelvey that it is a danger, but I think it is a danger that can be overcome by the right planning man. His job is not to usurp authority or to let planning and the questions involved in planning slide into oblivion.

As I see it, his job is to structure the questions, propose the alternatives, make sure they are analyzed, let the boss make the decision, and keep bugging him until he does.

MR. HENNINGTON: I would add that, if the planner is on the chief executive's staff and works with the chief executive intimately, the planner becomes the right hand of the chief executive. This is one way for the chief executive to carry out his responsibility for planning.

## MORTALITY TRENDS

1. What are current trends in the mortality level of the general population, of ordinary insurance (medical and nonmedical) and annuities?
2. How are these trends affected by war deaths?
3. What future trends could be expected?
4. What are the problems of measurement of mortality levels and trends?
5. Do these trends or expectations have any implications for computing rates or reserves for
  - a) Life insurance?
  - b) Immediate or variable annuities?
  - c) Social security?

MR. FRANCISCO BAYO: In the first forty years of this century there was a continuous, although sometimes erratic, decrease in mortality. The wide fluctuations observed were mainly due to epidemics. Then, in the late 1930's, a strong acceleration in the decrease in mortality began. Most of this acceleration was due to improved public health practices and to antibiotic wonder drugs.

By the mid-1950's the declining trends had shown a tendency to level off. Most of the decreases in the 1940's and early 1950's had been due to improved control of the communicable infective and parasitic diseases, so that by the mid-1950's they had very little effect on the total mortality. Therefore, further reduction in their level would not have a strong effect on the total mortality.

In fact, in the last fourteen years (up to 1968), there has not been a significant change in the age-adjusted death rate for the total population of the United States. This stability in the rate is the net result of a small decrease in the death rate for females and a small increase in the death rate for males. On the basis of the life expectancy at birth the picture is slightly different. Males have had a more or less level life expectancy during the last fourteen years, but life expectancy for females has increased about one year. The total population, therefore, has a life expectancy of about half a year higher than it had fourteen years ago. It could be said that mortality has leveled off for males, while for females it is still decreasing, but at a very slow rate.

A more detailed picture can be obtained if we look at the trends by age groups. Although the decrease in mortality during the 1940's and early 1950's was applicable through the entire age range, it was more pronounced at the younger ages. Almost without exception the decline

varied inversely with age. However, for practically all ages there was a change in trends around the mid-1950's. At the younger ages there was a deceleration in the rate of decline with a later leveling-off, while at the older ages there was a halt in the decline, but at the very high ages there were even indications of a tendency to increase. These changes in trends were more pronounced for males than for females.

The most recent experience shows that mortality has become almost level. During the 1960's, with the exception of the childhood ages, there has not been any decrease. In fact, for males in the early adult ages (20-44) there are indications that mortality is now increasing. In calendar year 1968, mortality showed a slight increase for all adult ages. In addition, the fractional data available for 1969 do not give any indication of a decrease.

In summary, I would say that mortality decreases have come to a complete halt. It is only at the childhood ages, particularly during the first year of life, that we are still observing some decline.

**MR. W. ALLAN KELTIE:** In Canada the mortality rate is computed from an annual study made from registered deaths and from the projection of the Canadian population between the five-year census dates.

The results, comparing the early 1960's with the most recent study, which went to 1967, show that, as was the case in the United States, there was no significant change in the mortality levels for the broad age group 5-70.

As was also true in the United States, mortality in the age group 0-4 decreased, largely due to the improved care in the first year of life.

On the other hand, a significant improvement was noted for ages over 70. It amounted to roughly one-half of 1 per cent per year, which means that between 1960 and 1967 there was roughly a 3 per cent decrease. This does not parallel the experience in the United States.

These trends were noted for both males and females, with the exception that the improvement for females occurred at ages 55 and up, whereas for males it occurred at ages 70 and up.

**MR. NORMAN F. BUCK:** In order to determine what is happening to insurance mortality, we looked carefully at the intercompany experience in the five policy years 1962-63 through 1966-67. Figures for 1967-68 have not yet been published.

In the ultimate years, durations 16 up, the mortality has been declining rather steadily at about 1 per cent per year. In the select years, for

medical and nonmedical combined, the series has been a bit more erratic, but again the mortality has been decreasing at about 1 per cent per year. These figures exclude war deaths since 1964 anniversaries.

MR. KELTIE: Canadian and United States companies doing business in Canada report annually their Canadian insured life standard issue mortality experience through the Canadian Institute of Actuaries. Several trends have been observed that started in the early 1960's and followed through to the last report in 1967.

For select durations, arbitrarily set at the first five policy years following issue, no discernible trend has been noted, with mortality ratios remaining at roughly 100 per cent of the base period 1958-64.

For policies more than five years in force, a significant improvement since the early 1960's has been noted. The mortality ratios in the last two years have averaged 92 per cent of the base period centered in 1961. They jump around a good deal from year to year, as there are only approximately 15,000 deaths each year for all ages combined, and only 1,400 of these occur at select durations.

The improving mortality from the ultimate duration insurance data parallels the experience noted in the census data at the high ages; and, of course, the insurance data are heavily weighted in ultimate durations at the higher ages.

To summarize, the Canadian population statistics and the insured life experience since the early 1960's indicate that mortality has improved slightly at the higher ages.

MR. BUCK: In the past few years insured mortality has not been slowing down. In comparison with that of ten or twenty years ago, it has, I would say, been slowing down. The insured mortality is going down about 1 per cent per year. At the older ages on medical business in the select period, it is going down more rapidly than that.

MR. CHARLES E. RICKARDS: What do we mean by the mortality of the general population of the United States when we compare that with insured lives? Are we talking about the total population, about white males, or what?

MR. BAYO: By general population I mean total population of the United States, males and females, whites and nonwhites. Let us look at the trends by color. Mortality of nonwhite in the United States has always been higher than that for white. Although, in absolute terms, mortality

for nonwhite has improved more than it has for white, in percentages the decline in the differential is smaller. The white-nonwhite differential in mortality varies by age and sex and is greater for females than for males. At the present time the excess mortality of the nonwhite is about 80 per cent at ages under 1, which represents a minor improvement in this century. It decreases to about 40–50 per cent at childhood and adolescence, at which age periods there has been a large improvement. At the young adult ages (20–44) there actually has been an increase. At those ages the nonwhite mortality is 100–200 per cent higher than is the white mortality. At the middle ages (45–65) the differential is smaller and has remained about the same in this century. At the older ages the differential is reversed, and nonwhite mortality is lower than white mortality. This has remained constant.

Census error may have something to do with the rather large excess in the differential at the early adult ages. It is now accepted that the net undercount in the 1960 United States census was about 3 per cent for the total population. For the white population, however, it was about 2 per cent, for nonwhite, about 10 per cent. At the young adult ages, nonwhite males are estimated to have been undercounted by about 20 per cent. This could be interpreted to mean that nonwhite mortality at all ages should be lower than that shown by official tables and that this is particularly so for males at the young adult ages. If corrected population figures were used, the differentials would still be there, but they would be smaller.

The Bureau of the Census is planning to place special emphasis on the enumeration of minority groups, particularly of young nonwhite adults in the 1970 census. If the census is successful in 1970, we may note a reduction in the white-nonwhite differential according to official tables.

Let me add at this point that, from studies we have conducted on the basis of social security data, we have found the differential in mortality between white and nonwhite at the older ages to be smaller than that shown by the official tables. It is smaller where the differential is in favor of the white as well as where it is in favor of the nonwhite. Our studies demonstrate that there is more similarity in mortality than is shown by the official tables.

I would expect to see an improvement in this differential in the future. It should get smaller as we move into more equality between the two groups in our society.

In regard to sex, we all know that females have lower mortality than males. We also have seen how this differential has been widened in this century. During this century female mortality has decreased faster than male mortality at all ages and particularly at the young adult ages. The



control of tuberculosis, which killed so many young females, and the high accident rate that males are now experiencing have resulted in a mortality rate for females in their early twenties that is about one-third the mortality rate for males. Let me say also that current trends point toward a widening of this gap.

An international comparison shows that the differential by sex varies inversely with the level of mortality, that is, the highest differentials are found in the countries with the lowest mortality. This could be interpreted as an indication that, if mortality decreases in the future, the differential between males and females would continue to increase.

MR. KARL M. DAVIES: I have a question raised by Mr. Bayo's statement that there has been no population mortality improvement and Mr. Buck's statement that there is a 1 per cent per year improvement in insured mortality. What is the explanation?

MR. BUCK: I do not really know, and I am not at all sure that the difference is significant; it may be within the realm of measuring error or even of chance.

If it continued for ten years running, I would have to look for something deeper in the way of causes. Perhaps it is due to the increasing skill of our underwriters!

The thought occurs to me that, as we continue to go into larger average-size policies on ordinary insurance, maybe we are getting into a higher and higher economic level, more concentration of our business at economic levels that have a little lower mortality than some of the market that we have been in.

MR. DAVIES: My impression is that the market is broadening. Our agents are moving into lower economic levels.

MR. EDWARD A. LEW: When Mr. Buck spoke of the 1 per cent improvement in mortality among insured lives, he was, I believe, referring to the trend in mortality under recent standard ordinary issues of the nineteen or so companies that contribute to the intercompany study. Mr. Davies may well be right that agents of many companies have been moving into lower economic levels, but I suspect that the contributions to the intercompany study have in recent years come to include a greater proportion of people drawn from the higher socioeconomic groups than before.

I base this conclusion on the fact that, beginning with the issues of

1960, Metropolitan ceased to contribute to the intercompany study data on standard ordinary policies for less than \$5,000. We know that this substantial chunk of our standard ordinary business has been subject to higher-than-average death rates and, conversely, that our experience on policies for \$5,000 or over has been relatively favorable. On the issues of 1960 and later years Metropolitan has accounted for about 15 per cent of the total exposures by amounts of insurance. Several other large companies have also limited their recent contributions to the experience on policies in excess of a specified amount. There is reason to believe, therefore, that the 1 per cent improvement noted in the intercompany experience on insured lives reflects to a marked degree the effects of a greater proportion of larger policies which carry somewhat lower death rates.

MR. FRANK H. DAVID: We do not contribute our experience on policies under \$2,000. We know that those have a higher mortality than the policies for larger amounts.

CHAIRMAN ANDREW C. WEBSTER: This has always been one of the problems of the report on mortality, since a great deal depends on the extent of the sample you get and also on the underwriting practices of the companies.

MR. THOMAS R. HUBER: Could there possibly be a problem in that in the insurance company mortality figures you are excluding war deaths but in the population mortality war deaths are included?

MR. BAYO: In population mortality we record the deaths that occur in the United States. War deaths recorded in the United States are only those of persons who return from the battle to the United States with war injuries and then die in the United States after a relatively short period. This is a very minor factor in the total mortality of the United States.

MR. CHARLES A. ORMSBY: In connection with this question of comparing insured mortality with general population mortality, it seems to me that the movement on the part of the industry to much higher minimum amounts of insurance would have some effect on the comparative figures. It might be helpful if a member of the panel could describe briefly the basis for the comparison; that is, the kind of mixture of select and ultimate mortality among the insured group that is being compared with the population group.

MR. BUCK: I will quote four numbers. This is a comparison of United States population mortality, all races and both sexes, from the 1960 census with the most recent tables reflecting intercompany experience on medically examined ordinary business for issue age 37. The ratios are as follows: policy year 1, 251 per cent; policy year 2, 213 per cent; policy year 11, 131 per cent; policy year 21, 105 per cent.

MR. CHARLES N. WALKER: What about the nonmedical mortality? I am thinking in terms of the tremendous changes that we have seen in the last ten years in nonmedical amounts and procedures.

MR. BUCK: In the select years, nonmedical mortality has been decreasing about 1 per cent per year. Those figures exclude war deaths.

I mentioned before that at the older ages, 45 and up, where there is little nonmedical experience, select medical mortality has dropped off significantly in the past couple of years, giving us a seeming shift between medical and nonmedical mortality for all ages combined.

CHAIRMAN WEBSTER: I wonder whether we could analyze some of the causes of death. I recommend for your evening's reading during the long winter months the analysis of the 1959-61 census table by cause of death (*U.S. Life Tables 1959-61*, Vol. I, No. 6). This publication, authored by Mr. Bayo, not only analyzes the census results by cause of death but also includes tables showing the change in mortality assuming certain causes of death were eliminated.

MR. BAYO: An analysis of mortality trends based on population data cannot be performed without the study of trends by causes of death. The general mortality trend is really a composite of the trends of the various causes.

Naturally, due to time limitations, it would be impossible to discuss all causes of death or even the most important causes of death. Even if we had unlimited time, I still believe that it would be better to combine the individual causes into groups. We know that classification of causes changes with time and from country to country, but it is still possible to combine them into broad groups and to get some valid results. Let me discuss a few of the most important broad groups.

Death rates due to infective and parasitic diseases have decreased and are still decreasing, although at a lower rate. Tuberculosis is one of the most important causes in this group. Death rates due to this disease are still decreasing rapidly. Influenza and pneumonia, another group, showed

a substantial decrease until the mid-1950's, when it reached the lowest value, but since then it has had a tendency to increase in an erratic fashion.

Mortality due to cancer has been increasing on a more or less continuous basis, although at a very slow rate. Most of this increase is currently due to males. If we look at the individual causes by site, we find that the level of cancer mortality would actually have dropped slightly during the last two decades if it were not for the increases in deaths due to cancer of the respiratory system and, to a lesser extent, cancer of the breast. The increase in death rates due to cancer has been observed at all ages, but it has been more conspicuous at the middle ages.

Cirrhosis of the liver is another cause of death that has shown a persistent tendency to increase. On the other hand, diabetes decreased rather rapidly until the mid-1950's but has been increasing since then.

The most important group of causes of death—cardiovascular-renal diseases—has been decreasing for many years. The decrement is currently slow and mostly due to females. Also, it is occurring principally at the younger ages. There are some indications of an increment in mortality at the very older ages (85 and over) due to these causes.

Finally, we have the deaths due to violence (accident, suicide, and homicide), which are slowly increasing. In particular, homicide has shown a tendency to accelerate.

**MRS. ANNA M. RAPPAPORT:** Mr. Bayo, do you think that some of the changes in causes, and also in trends, might be due to changes in the method of reporting—for example, the cancer change? Do you think that is a real trend, or is it better information?

**MR. BAYO:** I do believe there is a definite change. When we group them in such broad groups, the misclassification would be minor.

**MR. KELTIE:** Looking at the five leading causes of death—accidents, suicide, strokes, heart, and cancer—for insured lives and the population in Canada, you have the following pattern in the last five years.

For accidents, in the general population of Canada in the broad age group 25–65, the death rate increased by about one per hundred thousand per year. In the younger age group, adults 15–25, the annual increase was between two and three accidental deaths per hundred thousand per year. However, for the population group aged 70 and up, no increase in the accidental death rate was noted. For insured lives, an increase of 15

per cent in the accidental death rate was noted over the five-year period at almost all ages and durations.

No trend was apparent for suicide or stroke. As was true in the United States, the death rate from heart and circulatory disease was down, both in the population and in the insured life group.

As was the case in the United States, the death rate from cancer and malignant growths increased in the Canadian population, particularly at ages 65 and up. For insured lives, there was no trend.

**CHAIRMAN WEBSTER:** I should like to pick up another point which may be of importance to us in the underwriting field. Norman, have you anything to say about the effect of socioeconomic status on mortality?

**MR. BUCK:** I am certain that, to the extent we broaden the market, as Karl Davies indicated, and serve a wider segment of the population, it will tend to raise mortality of insured lives.

**CHAIRMAN WEBSTER:** I would like to push this a little further. The question I would like to ask is this: In a more affluent society, with better public health facilities, can we expect an improvement in population mortality because of the socioeconomic improvement? There have been studies of the effect of socioeconomic factors, such as income and education, on mortality.

**MR. BAYO:** I believe that it is possible to have a decrease in future mortality because of improved socioeconomic conditions.

Naturally, we know that it is impossible to isolate the effect of the various socioeconomic factors, such as occupation, income, education, type of life, residence, and so on, that influence mortality, since these factors are somewhat interrelated or correlated. Studies conducted in various countries, including the United States, have shown that there is a definite relationship between occupation and mortality. Professionals have the lowest mortality, while laborers have the highest mortality. Between these two groups, there is a smooth mortality increase applicable to administrators, managers, clerks, skilled workers, semiskilled workers, and the like.

I believe that the most important socioeconomic factor is education. To a large extent, education is a very important determining factor in regard to occupation; that is, the type of work that we do depends to a very large extent on our education. In turn, both these factors have a strong effect on income, type of life, residence, and so forth. Kitagawa

and Hauser published a paper in the 1968 issue of *Demography* on the relationship between education and mortality. They showed very unequivocally that there is a strong effect on mortality by education. According to their analysis, mortality for both male and female decreases with the level of education. This was found to be true for all causes of death except for cancer of the prostate for males and cancer of the breast for females, where, for unknown reasons, mortality tended to increase with education.

They also found that difference in mortality due to education is more pronounced for females than for males. In the case of females, the differential is found at all ages, but for males the differential is negligible at ages 65 and over.

This could be interpreted to mean that, as our population becomes more educated, we should expect a decrease in mortality and that this decrease should be more significant for females than for males. Also, we could say that a portion of the decrease in mortality that has been observed in the past could be viewed as being due to improved education, in addition to what we have seen constantly quoted as "improved public health services and the wonder drugs."

In my opinion, a large portion of the mortality differential between whites and nonwhites could be due to a differential in the level of education, and we should expect that, as the level of education of the nonwhites improves, this differential should decrease. Therefore, as the socioeconomic gap in our society between whites and nonwhites is closed, we should expect a narrowing between the white and nonwhite mortality.

**CHAIRMAN WEBSTER:** What about socioeconomic factors in underwriting residents of foreign countries?

**MR. BUCK:** I can cite two examples. One occurred some years ago in Puerto Rico, where we and the other companies all charged an extra premium. We took a good look at our insured ordinary mortality there and found that it was about the same as that in the United States, a little higher at the young ages and longer duration but not enough to warrant an extra premium. So we went to standard United States rates. I suppose people there having ordinary insurance were living under much the same living conditions and health care as people in this country. A more recent illustration is in the Philippines, where much the same situation exists as that in Puerto Rico.

MR. GEORGE W. WILSON: My company (Sun Life of Canada) writes business in South Africa, where the over-all population mortality is much heavier than that in Canada or the United States. In spite of the fact that we underwrite on the same general basis in South Africa as that used on this continent, our insured life mortality on white lives is 10-15 per cent higher in South Africa than it is in Canada or the United States. I think this bears out the point made earlier by Mr. Webster, that there appears to be a relationship between population mortality and that of insured lives.

We also have experience in the Philippines, where our over-all mortality results are quite satisfactory. Our business is done mainly among the higher economic classes. This confirms the experience referred to by Mr. Buck. I might add that our latest mortality results from various countries formerly regarded as subtropical have shown an improving trend, especially at the middle and older ages.

MR. DAVID BAHN: Referring to at least an apparent difference between population mortality and individual ordinary insured mortality, I wonder whether anyone can comment on what the trend of group insurance mortality is now. Is it following the population, or is it following the individual insurance?

MR. BUCK: I do not have anything on the trend, but the following figures give you some idea of the relationship. They are ratios of group to ordinary mortality, again based on recent intercompany experience and again at issue age 37: policy year 1, 202 per cent; policy year 2, 174 per cent; policy year 11, 121 per cent; policy year 21, 108 per cent.

CHAIRMAN WEBSTER: Underwriters have attempted to save money by cutting down on expenses, even though the resulting mortality may be slightly higher than normal. Perhaps, Norman, you would like to say something about whether what we might call "underwriting styles" are going to have an appreciable effect on the mortality in the future.

MR. BUCK: First of all, I am not sure that our expenses per thousand of insurance are really going up so much. We are all accustomed to looking at the cost of an inspection report, the cost of statements of an attending physician, and so on. I think these are certain to go up and will continue to go up for a while. Whether the cost per thousand is going up or not, I am not sure.

By underwriting styles I suppose you are distinguishing among conservative, liberal, and middle-of-the-road underwriting practices. The intercompany ordinary mortality studies give us a chance to measure the effects of different styles—or luck. In 1960–61 five of seventeen companies had ratios of actual to expected mortality on select medical business that were more than 10 percentage points away from the aggregate. In 1966–67 there were seven such out of nineteen companies. Five out of seventeen, seven out of nineteen—not much change. For the whole time period, about twice as many companies outside this 10-point range were below the aggregate as were above.

The patterns and trend were similar on select nonmedical. On ultimate experience, medical and nonmedical combined, there were even fewer companies outside the 10-point range, with no trend.

MR. KELTIE: I think that what is happening is a result of the paramedical field. Very briefly, a paramedical examination involves substituting a report by a nurse or a qualified person of that caliber for the physical examination made by a physician. The report would include build and blood-pressure readings and a few other factors and would be supplemented by chemical tests of blood and urine and sometimes by an electrocardiogram.

This paramedical form of examination is part of a much broader development. Companies try to offset the increasing costs of medical evidence by substituting a less expensive form or even doing without some forms of evidence. For example, inspection reports or attending physicians' reports are being either waived or used only for higher amounts, even though it has been proved repeatedly that the amount spent on doctors' reports was repaid many times in mortality savings.

So I think that what is happening is that we are saving expense dollars and taking our raps on the mortality side; so, to an extent, we control the mortality trends.

I feel that paramedical forms will result in a somewhat higher mortality, but perhaps it will not be enough to create a trend.

MR. BUCK: I expect that our mortality on paramedical business will be at least as good as that on medical business.

I think we have in the paramedical device a method of identifying more substandard risks than we want. I mean by that that we could rate more people than is good from a public relations standpoint.



MR. ORMSBY: Some here may not realize that for a number of years a few companies have had what I call an intermediate medical examination—one that costs \$5 or \$7.50 instead of \$12.50 or \$15.

Mr. Keltie has talked about the increase in expenses as perhaps the most important factor leading us to the paramedical examination, and I do not question that. But I would point out that for years we have needed an intermediate examination or a set of intermediate examinations.

CHAIRMAN WEBSTER: I wonder whether any of you have any comments on the problems of measuring insured mortality? This harks back to some of the comments made earlier in the session about the weight of the contributions of certain large companies to the mortality studies.

MR. BUCK: Sampling is an obvious possibility, but I do not know whether I would recommend it. You would lose smoothness in the results.

MR. JOSEPH C. SIBIGTROTH: I do not see much point in a sampling process if you are not sure of the kind of standard you are trying to develop. In our actual studies we obtain experience from nineteen large companies. This collection of data obviously is not representative of insurance mortality for the entire industry. For one thing, none of the experience of the many small companies is included. If small-company experience were included, the over-all mortality results could be quite different. Before instituting any sampling process, I believe we would first have to decide what kind of mortality standard we are looking for. The elimination of certain proportions of the data of companies with large contributions would not necessarily give us a mortality standard which is any better defined than what we now have.

CHAIRMAN WEBSTER: I think that is correct. The point we are trying to make is a good one. I think we must try, first of all, to develop a standard of measurement, even though we have this widely varied group of companies.

Second, we must provide some indication of where mortality should be going. In other words, if you have the studies for the last five or ten years, you have some indication of what the mortality trend among the seventeen companies is, and you, as the underwriter or actuary of your own company, can make up your mind as to whether this is something your company should be experiencing or not.

Mr. Bayo, one of your duties in the Social Security Administration is

to forecast the mortality of the population affected by social security. Have you any feeling as to what the census mortality is likely to show when you finally get it analyzed and compared with the last census?

MR. BAYO: In the ten-year period there might be a slight decline, but that decline would be smaller than what we have been projecting for social security. If I were going to prepare a population projection for evaluation of the national system in the United States, I would increase the mortality.

CHAIRMAN WEBSTER: What are the panelists' guesses as to the future trend of life insurance mortality?

MR. KELTIE: As I see what is going to happen, based on what I said earlier about Canadian insured life and population mortality, there will be a gradual improvement continuing particularly into the high ages. It will be offset by two trends—the increasing death rate from accidents and the slightly increasing death rate from companies trading expenses for slightly higher mortality. What the outcome of the total mix will be, I guess time will tell.

MR. BUCK: First, there is an increase in population, which means more crowding, which means more pollution. We hear a great deal about pollution of air and water, and about insecticides, which some people say are harmful. With the crowding we are getting some changes in standards of living and in moral standards. Maybe these partly explain the increase in violence. We have the phenomenon that, apparently, some strains of viruses and germs are developing which are increasingly resistant to some of the medication developed in recent years.

So we have factors at work to raise the mortality of the general population.

On the other hand, we have a very able body of people in medical science working to lower mortality. I think that they will keep whittling away at cancer and arteriosclerosis in particular; I do not think that the breakthrough, if there is one, will come all at once.

We have these two things working in opposite directions. If I had to make a guess, I would say, for the next five or ten years, very little change.

CHAIRMAN WEBSTER: As I mentioned before, the tables developed from the 1959–61 census show the effect of entirely removing certain causes of death. When we look at the expectation of life at the age of zero,

the effect is dramatic. When we look at it from age 50, however, it is not quite so good. In other words, the salvation that is going to occur by improvements in medical treatment of various diseases is perhaps not as great as it might seem.

I am now airing one of my own pet prejudices. I happen to agree with Mr. René Dubos, who maintains that immortality is a long way off, and, if you happen to kill off one cause of death, another one will appear. This has been demonstrated over the last ten years, I think, in the pneumonia and influenza group, in which there is now developing a strain of pneumococcus which thrives upon the antibiotics, if you please. The death rate from pneumonia, while it is not severe and does not really affect the mortality very much, is going up.

MR. LEW: No discussion of possible future mortality trends can omit weighing the consequences of some form of physiological limit on the human life span.

Mr. F. M. Redington, former president of the Institute of Actuaries, has given this question a great deal of thought, and he presented his findings early in 1969 in a paper entitled "An Exploration into Patterns of Mortality." By fitting a Gompertz curve to English mortality rates from age 35 on and considering the implications of the changes in the values of the Gompertz constants between 1911 and 1951, he has tried to deduce a few tentative conclusions about the physiological limits to life.

Briefly, he reasoned as follows. Since the turn of the century the constant  $B$  has been decreasing while the constant  $c$  has been increasing. If we express  $B$  as  $c^{-Z}$ , the force of mortality becomes  $c^{x-Z}$ , and  $Z$  may be interpreted as the age at which the annual force of mortality equals 1. This age has decreased from about 103 years in English Life Table No. 8 (1911) to about 100 for males and 102 for females in English Life Table No. 11 (1951).

Clearly  $Z$  is, in part at least, a genetic factor, while  $c$  is mainly an environmental factor. This conclusion is consistent with the improvement in environmental conditions since the turn of the century, but there is the question of why  $Z$  has been decreasing.

It has been noted that most mortality tables tend to converge at ages in the eighties and that in countries such as England, where the death rates at the older ages are reasonably reliable, there is a "crossing over" of the mortality curves, that is to say, the more recent mortality tables show higher death rates at ages in the nineties than did earlier mortality tables. Mr. Redington found this cross-over very puzzling, but my late

associate Mortimer Spiegelman and I came to believe that it could be explained along the following lines.

When environmental conditions and standards of medical care are improved, it is likely that groups of lives who are intrinsically subject to higher death rates and who may have succumbed under less favorable conditions, can be kept alive somewhat longer than before. Modern science and medicine have undoubtedly enabled more diabetics, more persons with serious heart disorders, and others in poor health to survive longer, but, at the ages when the genetic forces become dominant, a higher proportion of impaired lives in a mixed population will result in an increased force of mortality.

After exploring mortality patterns by reference to the Gompertz curve, Mr. Redington reached the conclusion that environmental mortality approximates closely to the exponential but that the genetic portion of the force of mortality falls away from the exponential. He is of the opinion that there is a physiological barrier to the effects of environmental improvement. This hypothesis backs up our chairman's skepticism about the prospects of immortality.

## NUMERICAL ANALYSIS

1. What is the general scope of numerical analysis? What has been the relationship between numerical analysis and actuarial science?
2. What topics in numerical analysis have direct actuarial application? Are there actuarial problems now being treated by other techniques which could be handled better by numerical analysis?
3. What has been the impact of electronic digital computers on the daily work of actuaries? What types of problems can successfully be dealt with by means of desk calculators or computers?
4. What changes in the Society's education and examination system are planned to incorporate elements of numerical analysis into the formal training of actuaries?

PROFESSOR JAMES C. HICKMAN: Actuaries have been doing numerical analysis all their lives, although I do not want to imply that they know all the numerical analysis that they need to know.

Numerical analysis is the study of methods for efficiently producing numerical results from mathematical models and estimating the error involved in these methods. Numerical analysis has tended to develop rapidly as a separate mathematical topic in recent years for three reasons: (1) Much of the thrust of pure mathematics is directed toward proving theorems from carefully selected axioms. (2) The techniques used in proving the existence and, perhaps, the uniqueness of solutions implied by mathematical models may not lead to efficient methods for computing these solutions. For example, the direct evaluation of determinants is not usually a very efficient method of solving a system of linear equations. (3) The advent of large-scale electronic digital computing equipment has revolutionized numerical analysis. Computer power is now of the order of  $10^6$  greater than it was at the end of World War II. Frequently, surprisingly simple methods can be efficiently combined with the blinding speed of computers. For example, to find the extreme values of a function, it may be quicker to evaluate the function at a great many points rather than to follow a more complicated procedure. Approximate integration, using the simple trapezoidal rule and a narrow interval, may produce more accurate results and in less time than the application of an approximate integration formula with a higher degree of precision. The advent of the large-scale computer has made possible a return to primitivism in some mathematical problems.

Actuarial education has included work on the calculus of finite differ-

ences to force actuaries to understand the interpolation, approximate integration, and numerical differentiating formulas required in performing their daily work. Actuarial interest in these topics arose early in the history of the profession because the mortality table, the life actuary's basic tool, specifies a survival function, which is assumed to be continuous, at only a finite set of points. Consequently, actuaries were forced from the beginning to employ numerical analysis to use their mortality tables. Actuaries who use the continuous model to compute individual life insurance premiums and reserves are performing approximate integration each day. The current move to use computer-oriented numerical analysis as a substitute for the calculus of finite differences does not constitute a shift in the objectives of the actuarial education. Rather, this change is simply a measured response to the computer revolution, the changes in mathematics education, and the theoretical developments in numerical analysis.

Contributions by members of the actuarial profession to the development of numerical analysis have been particularly valuable in the field of graduation. This includes spline functions, in which field T. N. E. Greville, F.S.A., has been a major contributor. Greville calls the modified osculatory interpolation formulas published by W. A. Jenkins, F.S.A., in 1927, "the earliest published work in which spline functions of degree greater than one were used." Of course, Jenkins' modified osculatory interpolation formulas are part of a long line of development within actuarial science which has been concerned with interpolation formulas with even greater smoothness. For example, the formulas of Sprague, Karup, and King come to mind.

Topics in numerical analysis which may be applied in actuarial science, in addition to interpolation, approximate integration, and numerical differentiation are the following:

1. *The solution of nonlinear equations.*—This is frequently necessary in determining the yield rate on a complicated investment. The determination of the implied internal rate, or rates, of return may now present a serious numerical analysis problem. (See L. Fisher, "Computer Algorithms for Finding Exact Rates of Return," *Journal of Business*, Vol. XL [1967] for an application of the Newton-Raphson method.)

2. *Solution of systems of linear equations.*—This includes the Whittaker-Henderson graduation method, as well as a new method for the construction of life tables which was used for the 1959-61 U.S. Life Tables. (See T. N. E. Greville, *Methodology of the National, Regional and State Life Tables for the U.S., 1959-61* [Department of Health, Education, and Welfare, Public Health Service Publication No. 1252].)

3. *Approximation of functions.*—Least-squares approximation, orthogonal polynomials, and Chebyshev polynomials may be useful in providing close approximations to life insurance dividends and certain other actuarial values whose computation may prove to be detailed, complicated, and time-consuming. (An elementary example is to be found in D. M. Good, "The Problem of the Installment Loan," *The Actuary*, June, 1968.)

4. *Transform calculus.*—This topic is an important problem in collective risk theory, where it is frequently relatively easy to display the Fourier transformation (characteristic function) of the total claims during a fixed period. The trick is to invert this transformation so that the distribution function of total claims may be evaluated. This can be quite a difficult trick, because the integral that must be evaluated is complicated, has an infinite range, and must be evaluated by using only a finite number of points and only a finite amount of computing time.

Because the problem of inverting a Fourier transformation occurs in statistics and in other branches of applied mathematics, there has been considerable work on this problem. In the process of carrying out its assignment to check on the various approximations that are sometimes used in the practical applications of risk theory, the Swedish committee to investigate risk theory approximations explored several interesting possibilities for inverting Fourier transforms to evaluate distribution functions. The C-method developed by Bohman in the course of the work of this committee represents a new development in numerical analysis. (See *Skandinavisk Aktuarietidskrift*, 1963, for the Bohman-Esscher report.)

5. *Monte Carlo methods.*—Currently the term "Monte Carlo methods" is used to label almost any method which employs random numbers. Within actuarial science random numbers have been used to add some realistic variation in management games and in asset share and model office expected value results to be accompanied with an interval of possible results with an associated approximate probability. Although this type of computation was first used in the simulation of the random components of model office results about which probability assumptions are traditionally made (deaths and withdrawals), if the uncertainty about other financial factors can be quantified in the form of a probability distribution, they may also be entered into in a random fashion according to the assumed distribution. (See D. Sander, "Simulating the Random Components of Life Insurance Company Financial Results," *Journal of Risk and Insurance*, Vol. XXXV [1968].)

A second and very natural application of Monte Carlo method is in risk theory. Risk theory is concerned with the distribution of claims of an insurance organization. Whether the collective or the individual risk model is used, the application of risk theory to finding the distribution of claims for a nontrivial insurance group involves an enormous amount of computation. Much of the mathematical development in risk theory is directed toward finding approximations which will permit suitably precise probability statements about total

claims. These developments employ many techniques and results from limiting distribution theory of mathematical statistics.

It has appeared to some actuaries that a more simple and direct method of approximating the required probability statements would be to adopt a risk theory model and to compute a great many realizations of the model on a computer. Then the resulting distribution of the relative frequency of results could be used to make the probability statements of interest. These simulation methods may provide acceptably accurate probability statements for the short term, the term within which most business decisions are made. Analytic results in this field tend to pertain to the long term; that is, they are asymptotic results which may not provide an answer to the question of immediate concern. H. L. Seal's paper, "Simulation of the Ruin Potential of Nonlife Insurance Companies," which is being discussed at this meeting, is a superb example of the application of simulation to risk problems.

For many reasons actuaries should find the study of numerical analysis stimulating and their association with numerical analysts rewarding. Both actuaries and numerical analysts are oriented toward the solution of problems rather than the proving of theorems. Both groups are concerned with manipulating mathematical models for the purpose of gaining new insights into the phenomenon under study and not solely for the satisfaction of producing endless numbers. It is hoped that a closer association between the two groups will enable the actuarial profession to accentuate an already apparent trend by emulating numerical analysts in their willingness to harness electronic computers in new and ingenious ways in performing its professional tasks.

MR. JOHN E. HEARST: Several of my acquaintances, when they heard that I was preparing this discussion, asked, "What is numerical analysis?" Perhaps the simplest answer is to say that it is broadened finite differences. The textbooks I have reviewed cover the elements we learn in finite differences, that is, difference tables, interpolation in one and two variables, interpolation formulas, inverse interpolation, summation formulas, and approximate integration. Other topics, more often associated with the physical sciences and engineering than actuarial science, are treated, such as differential and integral equations, the solution of simultaneous linear equations, matrices and determinants, and the generation and propagation of errors.

It was apparent after the review of several of these texts that the orientation had been changing. Texts published prior to 1960 emphasize the use of a desk calculator for the solution of problems. Later texts were obviously oriented toward the use of the computer for calculations



leading to the solution of the problems. This change in orientation matches the change in methods of computation that we have experienced as actuaries.

Jim defined numerical analysis as a study of methods for efficiently producing numerical results from mathematical models. The key to the definition is the mathematical model. To the actuary a model often connotes an asset share or a model office or, what may be even more basic, the valuation. But the model of numerical analysis is usually much more basic. It is the technique which is used to find the general solution of a problem which is not expressed in a tractable form.

Nearly all the functions we deal with as actuaries are intractable, even when they can be expressed in an analytical form. Our mortality rate may follow a recognized law of mortality, but commutation functions are the tool we traditionally use to value our policies and to calculate our non-forfeiture values. Consequently, we must rely on techniques of numerical analysis to produce our answers.

Much of our success as a profession has come from our ability to find models to fit the facts which help us to see the future a little more clearly. Although many of the techniques of numerical analysis may be far more elegant than are needed for the solution of our actuarial problems, they should help us to improve our methods of obtaining solutions.

There are many actuarial problems which either have been ignored or have been handled by fairly crude techniques which can now be dealt with more precisely. John Mereu has shown a method to calculate annuity values directly from the Makeham constants rather than through the use of commutation columns. The evaluation of his integrals can be made by methods of numerical analysis. Although this technique has not been widely used, it gives promise of also permitting calculations for improvement in mortality and changes in investment income.

The traditional net cost formula for life insurance policies ignores all elements of interest and mortality. There is an increased interest in this area, and techniques are available to calculate these costs more realistically than they have been in the past.

With Monte Carlo techniques, companies can determine which forms of reinsurance and what limits are best suited for their particular circumstances. Group departments make use of these techniques to calculate the stop-loss premiums which are used in some of their dividend formulas. The imminent advent of the jumbo jets makes the calculation of catastrophe premiums and reserves an immediate problem for many companies.

The analysis of the federal income tax can be made by analytical means, as demonstrated in his paper by John Fraser by the differentiation of the

tax function. If a company is apt to be taxed on its policyholders surplus account, the easiest way to make the analysis is to project the effect of the tax by the use of a model.

There has been increased interest in the calculation of gross premiums to produce optimum profits, as described by John Bragg in "Prices and Profits," or to produce a predetermined level of profits, as described by James C. H. Anderson. Much of the calculation of these premiums rests on techniques of numerical analysis.

In our office we have used some relatively simple techniques of numerical analysis to calculate abridged life tables and commutation functions. Some of the same formulas are used to project benefit payments under pension plans. There is a large saving in clerical time when these methods are used.

Both companies and governments have often ignored future capital requirements. As a result many companies have failed in the recent tight money market. Perhaps a simple projection would have permitted them to understand their future needs and thus be prepared for this contingency. The states, similarly, are having problems producing enough tax revenue to meet their needs. Techniques are available to project both their needs and future sources of taxes.

It had seemed to me that the impact of computers on the daily work of actuaries would be reflected in substantially reduced costs. In the few cases where I have been able to test this, costs often increased even more rapidly after a computer had been installed than before. Perhaps it is not the promise of lower expenses but the hope of larger profits which leads managements to install computers.

The savings in time seem nearly as important to us today as the savings in expense. Companies could not meet their deadlines without their computers. The year-end valuations and the interim valuations could not be prepared in time for the annual and interim statements unless computers were used.

The computer permits us to calculate more quickly and efficiently than we could before. Many more items are calculated directly than by approximation. In the valuation area it is often as economical to calculate exactly the accidental death benefit reserve and the disability reserve instead of relying on the broad approximations which were used in the past.

In pension valuations, too, we are finding that many more items are calculated directly rather than by approximation, particularly in the valuation of the large municipal and state employee retirement systems. Some of these systems may have seven or eight different types of benefits, depending upon the classification of the employee, service, salary, and the

like. We have one such case involving 260,000 members which is valued in roughly 140 hours of computer time on our IBM 360 Model 30. We have not translated this to hours of clerical calculation time, but it would undoubtedly be several years of calculations.

The impact of the computer is seen in the life insurance products which are now being developed. Nonforfeiture and reserve bases are becoming considerably more complex. Values based on age last birthday are being used oftener. Two and three rates of interest varying by policy duration appear more frequently. Continuous functions are often used.

Asset share calculations are now being made at many more ages and with many more variables than had been used before, when manual calculations were made. Inflation can be introduced into the expense factors. Different levels of mortality and expense are used in place of expected values to estimate a product's profitability. Perhaps computers will soon be large enough that Monte Carlo techniques can be applied to the interest, expense, mortality, and lapsation factors in much the same way that they are applied to mortality factors today to study claim distributions.

Initially, when a problem which has been handled by a desk calculator is put on a computer for solution, the actuary may feel that he has less flexibility and control than he has when the work is done by hand. Programming often seems to take forever. Answers at first seem to come much more slowly. After the problem is once successfully handled on the computer, however, subsequent answers come much faster. The actuary often finds that he has greater flexibility to introduce new parameters which would have been inordinately expensive to introduce in any hand calculation.

Hopefully the computer will free the actuary from his routine clerical work and permit him to use his time more fruitfully in providing answers to the more serious problems which companies face.

Whether a problem can be successfully dealt with by a desk calculator or a computer depends upon the amount of time available until a solution is needed, the number of calculations required, and the number of variables involved. There are many problems where there is not enough time to program a computer before an answer is needed; this may be the case when one company is interested in assuming business from another. Or there may be too few calculations to warrant the use of the computer; this may be the case in valuing a small pension plan. In our office we have generally found it more economical to value pension plans with less than fifty lives by hand rather than by computer.

Problems requiring a minimum amount of calculations are best suited

for the desk calculator; for example, calculating a terminal reserve at a specimen duration. However, when the result is needed for the solution of a larger problem, such as determining the valuation basis which will maximize a company's after-tax earnings, the computer generally is best suited.

The desk calculator is ideally suited for checking work and for communicating with others. For example, an actuarial memorandum explaining the nonforfeiture basis of a policy listing a sample calculation is more readily prepared by a desk calculator than by a computer.

Calculation of expiry dates for lapsed policies is often more expeditiously handled by a desk calculator if there are few to handle. Similar asset share calculations for fairly short durations are easily made by hand. If two or more asset shares are to be constructed or if projections for longer durations are needed, however, the solution on a computer is more efficient.

The desk calculator has been changing in recent years. In fact, in many cases it is difficult to differentiate between the small desk calculator that has the capacity to be programmed and the small computers. The ruin function which was described by John Beekman in his paper has been programmed for one of the small calculators, the Olivetti Programma. Other companies use similar calculators to verify their bond amortizations, to calculate their individual annuity premiums, and to calculate federal and state estate taxes for their individual annuity business.

Marginal tax rates can readily be calculated on a desk calculator. However, if the impact of the tax is to be estimated for several years in the future, calculations can be made more readily on a computer.

Even though most of our calculations are being made on the computer, it is still our models which serve to generate the solutions for our problems. The models are becoming increasingly complex because computational means are available to handle the complexities.

The actuary is in the enviable position of understanding the many interactions within these models and of being able to develop models which best portray the company and its products. If the student is to perform effectively, he too must know how to deal with these models and to recognize the computer for the powerful tool that it is.

MR. ROBERT J. JOHANSEN: Messrs. Hickman and Hearst have pointed out the manner in which the domain of the actuary has been expanded both by the need for more extended and even esoteric analyses and by the availability of the means to accomplish these analyses. The Education and Examination Committee has over the years followed the

evolutionary changes in the actuarial world. It might be worthwhile to review briefly some of these changes in the mathematical portions of the Society's syllabus of examinations—Parts 1–3 and graduation in Part 5.

The Parts 1 and 2 Committee, the personnel at the Educational Testing Service, and our consultants from the academic world make sure that the Preliminary Examinations (Parts 1 and 2) keep abreast of changes in college curricula. For example, ETS recently made a comparative analysis of Part 1 of the examinations to indicate how the relative emphasis given to different subjects has changed over recent years.

More pertinent to the subject of this panel discussion is the evolution in Part 3. In 1947, when the shift to a short-answer type of examination was made, the first nine chapters of Freeman's *Mathematics for Actuarial Students*, Volume II, were prescribed. By 1951, chapter viii, which dealt with special integration methods, had been deleted. The 1960 syllabus excluded material on the differences of zero, that is, on operations involving  $\Delta^n x^m$ , where  $x$  was then set equal to zero, and on integration using hexagon diagrams. The finite difference course of reading for 1969 excludes the entire discussion of the "Summation  $n$ " or  $[n]$  operator which was developed by British actuaries for use as a method of graduation prior to the advent of desk calculators. "Summation  $n$ " has also been eliminated from the Part 5 graduation readings.

As you know, finite difference formulas enter into some of the analyses and methodology in the study of life contingencies in such areas as the use of finite difference formulas for derivatives of life functions or in approximate integration to obtain values of mortality functions. These uses will be referred to later in describing our intentions for changes in Part 3 of the syllabus.

Along with changes in the finite differences course of reading, we have seen some changes in the study of graduation in Part 5. Since its publication in 1946, *Elements of Graduation*, by Morton D. Miller, has been the sole or principal reference for study. Currently, chapter iv on the adjusted average method and all the formula derivations in chapter x except those relating to the Whittaker-Henderson formulas are excluded. A study note discusses the theoretical aspects of error reduction through adjusted average methods and gives ways of arriving at linear compound formulas under various assumptions as to underlying curves and degrees of smoothing. The study note goes on to develop families of osculatory and modified osculatory interpolation formulas. Also included are an evaluation and discussion of the Whittaker-Henderson B formula which, at the time Miller's monograph was written, was practically impossible to calculate

with existing means and consequently was not developed to any extent in the monograph.

What we have witnessed has been a slow evolution in some of the basic ideas in the study of actuarial mathematics. There are indications that the evolution will be speeded considerably in the future, but it will still be evolution, its progress dictated in part by the need to allow for the interrelationships of subjects in the actuarial curriculum and in part by the availability of suitable text material. In charting the future course of actuarial education, we have had to evaluate the probable educational backgrounds of future actuarial students and to take a look at future demands on actuarial expertise. We have concluded that, from both viewpoints, numerical analysis is appropriate to the education of actuaries.

An interesting commentary appears in an essay on numerical analysis<sup>1</sup> by Philip J. Davis in which he points out that "most colleges offer at least one formal course in numerical analysis and many universities offer four or more semesters work in numerical analysis at the graduate level." He goes on to say that some universities will grant a Ph.D. in numerical analysis and that "practically all science majors will come in contact with numerical analysis directly or indirectly." Some high schools are offering numerical analysis courses, according to Professor Davis, and it is even being used in the teaching of traditional mathematics courses. These conclusions were echoed by several of the people with interests in actuarial education whose opinions were polled last year by the Study Group on the Mathematical Content of the Syllabus. Finite differences, on the other hand, is not generally taught in colleges, with the notable exception of courses aimed at the Society's examinations. Having mentioned the Study Group, the conclusions of which may be said to have triggered the decision to hold this discussion, suppose we next examine the purpose of the Study Group's formation and its recommendation that numerical analysis be incorporated into the actuarial examination syllabus.

Set up in December, 1967, under the chairmanship of John Fibiger, the Study Group was given the task of reviewing (1) the present level of mathematical preparation of beginning students of the Society, (2) the requirements for mathematical knowledge which actuaries face on the job, (3) the availability of appropriate text material in these areas, and (4) the means by which future mathematical developments of use to actuaries might be incorporated in the syllabus. The first point has been discussed. With respect to point 2 the Study Group felt that there was "much doubt as to whether Finite Differences was a sufficiently broad topic to be studied

<sup>1</sup> *Mathematical Sciences: A Collection of Essays* (Cambridge, Mass.: M.I.T. Press, 1969), p. 128.

for itself, as it does not include those computer-oriented techniques which are of ever-increasing importance." The recommendation was for replacement by "a more general topic, Numerical Analysis, in which the useful techniques of Finite Differences will continue to be covered." They felt that any text selected should "give full recognition to the changes in problem-solving techniques brought about by the development of electronic computers but, in view of the great diversity in programming languages . . . should not require the student to master a particular programming language."

With respect to graduation, in Part 5, the Study Group recommended adding material on "the application of computers and linear algebra techniques." Perhaps we may want to explore the direct use of statistical techniques as well, as suggested by the Kimeldorf-Jones paper on Bayesian graduation.

Some opinions have been expressed that the actuarial examination syllabus include a study of computer theory and technology. The Study Group rejected this idea for the following reasons:

First, there is no universally accepted language for electronic computers, and we believe that it is inappropriate to examine students on a language which is not universal. Second, the work of actuaries with computers will vary widely, depending upon the employer and the size and type of computer available. Third, we believe that instruction in skills can be readily acquired elsewhere, such as classes from computer manufacturers and programmed-learned texts. Fourth, the availability of computers to actuarial students varies very widely, especially for students still in universities, and we feel that students who would have access to computers could have a substantial advantage over students who did not. Finally, we believe that actuarial examinations should assess one's knowledge in those areas which uniquely distinguish our profession, rather than the tools which might be used in practicing our profession.

As a matter of fact, when I was checking into the uses of computers and desk calculators for actuarial problems, I learned that a number of jobs for which a computer would seem appropriate are being done instead on a desk calculator. To the extent that the desk calculator has storage areas and uses a program on a magnetic card, it is, in effect, a small computer. Among the reasons which can be given for its use are the eternal shortage of computer time and the time and trouble of writing, compiling, and testing computer programs for a one-shot job. Programs for the desk calculator would, of course, be different from FORTRAN or COBOL, for example.

Regardless of the final language or symbols in which a program may be

written, however, the logic can and should be expressed in a flow chart—the more detailed the better.

Inclusion of a particular computer language in the syllabus can also lead to early obsolescence of study material. By way of illustration, those of you who had to struggle with Spurgeon's *Life Contingencies* may recall that the author included several pages of description of the Arithmometer and its operation and then devoted a whole chapter to methods of calculation which made use of the features of what was termed "the most powerful aid to calculation in the construction of actuarial tables . . . now so universally employed by actuaries that it is thought no student should experience any difficulty in seeing one in practical use."

Now let us examine some requirements which a course in numerical analysis should possess, that is, what constraints should be placed on the selection of text material. Professor Davis, in the essay previously cited, states that numerical analysis "comprises the strategy of computation as well as the evaluation of what has been accomplished." He then goes on to give what seems to me to be a good definition of what numerical analysis should include:

1. The formation of [modes of procedure called] algorithms.
2. Error analysis including transaction and round-off error.
3. The study of convergence including the rate of convergence.
4. Comparative algorithms, which judges the relative utility of different algorithms in different situations.

Combining various recommendations, with a dash of judgment, might result in the following requirements for the subject matter of a course or textbook on numerical analysis:

1. The more useful parts of finite differences, including finite difference operators, interpolation, summation, numerical differentiation, and integration. These subjects are of importance not only in the study of life contingencies in Part 4 and graduation in Part 5 but also to provide actuaries with proper tools to make approximations when considerations of time, expense, or the form of the data make use of computer techniques inappropriate.
2. Iterative methods for computer solution of an equation, including convergence tests.
3. Computer-oriented methods of solving systems of linear equations, methods of matrix inversion.
4. Least-squares methods.
5. Simulation.

The desired text should not require the student to master any particular program language but ideally will present at least some of the techniques in flow-chart logic used in computer programming.



Last, but by no means least, among our specifications is the requirement that the textbook be suitable for self-study by students who do not have access to tutorial services. It should include examples illustrating the techniques and problems for the student. At the same time, the text ought to be one which is in use in at least a few colleges and universities.

While our review of textbooks has so far yielded only books which meet some, but not all, of these requirements, we have been hopeful of finding one which, with a minimum of study note supplement, will supply our needs. One textbook which seems to meet most of the specifications is the Sixth Edition (1966) of Scarborough's *Numerical Mathematical Analysis*. In addition, the publisher says that the book has been adopted as a text in hundreds of colleges and universities. Unfortunately, it does not include techniques of flow charting of computer logic. We have also looked at textbooks by Beckett and Hurt, Moursund and Duris, Hamming, Householder, and others.

While the Institute of Actuaries has recently substituted numerical analysis for finite differences in its Intermediate Examinations, the current text material includes substantial readings in Freeman's text (about the same as those in the Society's present Part 3 required reading) plus a study note and four chapters of a proposed textbook, *Numerical Analysis for Actuarial Students*, by M. J. Garside, obtainable from the Institute. The four chapters of the proposed numerical analysis text cover zeros of polynomials, solution of equations, the Runge-Kutta method, and simulation. A textbook on Algol programming is also included. The subject of programs of calculation, including block diagrams, modification, and conditional jump instructions, is included in the second paper of the Institute's Preliminary (Mathematics) Examination. It is interesting to note that students taking the Institute's Probability and Elementary Statistics Examination may be required to write Algol programs as solutions to some simple problems.

MR. THOMAS N. E. GREVILLE: Professor Hickman has already referred to the role of actuaries in the early development of spline functions, an important topic in numerical analysis in which there is much current interest. As he has indicated, the development of these functions was greatly influenced, and in part foreshadowed, by the earlier work of actuaries on osculatory interpolation. My colleague I. J. Schoenberg, who gave spline functions their name and first singled them out for special attention, had come in contact with some young actuaries, then serving in uniform, in the course of his work at Aberdeen Proving Ground during World War II. In his first paper on the subject, published in 1946, he

specifically mentions in this connection the late Chalmers L. Weaver. The paper also cites Jenkins, G. J. Lidstone, and myself.

Two decades ago, the topics of graduation and interpolation were almost the exclusive province of the actuary. At that time, mathematicians, with only a few exceptions like Schoenberg, regarded these subjects with ill-concealed disdain. Since then, interest in these areas on the part of certain applied mathematicians and numerical analysts has greatly increased, while the interest of actuaries seems to have diminished, with the result that today, surprisingly, it is easier to get a paper on such a topic published in a mathematical journal than it is in the *Transactions* of the Society of Actuaries.

Professor Hickman has also mentioned that one approach to Whittaker-Henderson graduation involves solution of a system of simultaneous linear equations. In fact, a number of people have remarked lately that this is the most convenient approach when a computer is available. A great variety of computer routines is available for solving systems of linear equations. This approach also has the advantage that a so-called Type B graduation presents no more difficulty than Type A. There is a possible pitfall, however. The actuary should be aware that the Whittaker-Henderson equations are what the numerical analyst calls ill-conditioned. This means that there will be very rapid accumulation of rounding error in the process of solution unless the procedure to be followed is chosen with some care. In a typical case, if the quantities being graduated are mortality rates per 1,000, the answers may fail to be correct to the nearest integer if one merely chooses the computer routine most readily available. Robert Henderson understood this well and suggested calculation procedures designed to minimize the problem of rounding error. Though the errors involved probably would not be of much practical significance, I think most of us would prefer to get more accurate answers if we could do so merely by exercising a little care in the choice of a computer routine for solving the simultaneous linear equations.

I am very pleased to learn from Mr. Johansen that the elements of matrix algebra will, in the future, be covered in Part 1. The Whittaker-Henderson graduation processes are a great deal easier to explain and a great deal easier to understand if this knowledge can be assumed. With the help of this simple mathematical tool, it is astonishing how neatly and simply everything falls into place in what is otherwise a complex subject. Only a very little matrix algebra is needed—little more than the rule for multiplying matrices and the existence and properties of the inverse matrix.

MR. HARWOOD ROSSER: The power of the computer invites fresh approaches. Under the Guertin nonforfeiture law, there are six possible cases for the adjusted premium to determine minimum cash values. Instead of making comparisons at intermediate stages and only one final calculation, it is simpler, on today's computers, to calculate this premium by all six formulas and to take the smallest answer.

Also, when performing interpolations by means of a computer, a choice among possible formulas should be made only *after* all have been applied. The computer can simultaneously furnish auxiliary data, such as differences and their sums, to facilitate comparison and choice.

A familiar related question is whether to store or to derive from more basic sources. This is usually resolved in terms of access time versus computing speed, taking storage capacity into account.

MR. GEOFFREY CROFTS: There is the feeling that actuarial students in insurance companies have more ready access to computers than college students, but I really wonder whether the reverse is not true. In the few universities and colleges with which I am familiar the students have very easy access to computers.

I feel that we should require actuarial students to know computer language. It is fairly easy to learn FORTRAN.

MR. JOHANSEN: The actuarial student may not have access to a computer at all or only to a very limited extent. The best way to learn a programming language is to write programs and learn what went wrong, but this takes quite a bit of computer time, and, as we all know, computer time is never available even for urgent jobs, much less the important ones.

We think that we would have a real problem in requiring a student to learn a particular language. There are not only FORTRAN, COBOL, and many others, but there are variations of these languages.

MR. HICKMAN: I think that most university students receive a high exposure to computers.

MR. LAVAL MATHIEU: University students have much more computer time available to them than we have in our company [Alliance Mutual Life Insurance Company, Montreal, Quebec].

MR. THOMAS C. SUTTON: To alleviate the problem of computer time, we rented an 1130, which is a relatively small computer. We made arrangements so that it is not necessary to go through the usual channels

to write a program or to test it. Consequently, our students have the possibility of using it at any time.

MR. RICHARD W. ZIOCK: I would like to make a plea for the use of FORTRAN. For most actuarial problems, I think that FORTRAN is the vehicle, not COBOL. We publish FORTRAN programs in the *Transactions*, and students should know how to read them.

MR. JONATHAN SCHWARTZ: The various levels of FORTRAN differ only with respect to the input/output statements. Therefore, the existence of several different levels of FORTRAN is not likely to cause serious problems. However, IBM has developed a language, called "PL-1," which might eventually replace FORTRAN.

MR. JOHN H. COOK: It is not necessarily true that FORTRAN can or should be the universal language of the actuary. In our company [Metropolitan] we feel that COBOL is far better than FORTRAN for actuarial valuation routines involving a large volume of tape records with relatively little calculation.

MR. DONALD R. ANDERSON: The scientists in our organization [Kates, Peat, Marwick and Company] prefer ALGOL.

MR. JOHN A. FIBIGER: One of the reasons our study group on the mathematical content of the syllabus recommended that computers not be put in the syllabus is simply because there is no agreement on this problem. Furthermore, many people come to the actuarial profession after their university training is complete and may not have access to computers where they are now working. To master computer techniques, it is necessary to have practical experience, and we should not close our profession to such people living in isolated areas, even though they may constitute a minority of our students.

MR. FRANK G. REYNOLDS: I agree with the committee recommendation. I worked four years with AUTOCODER in a computer installation and a few years with FORTRAN. However, I have not seen a manual that is useful as a teaching text. Existing manuals are primarily for reference purposes.

Furthermore, although our company [Great-West] is well advanced in the use of computers, most of our actuarial students are not seeing the programming languages.

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