

PROJECTION OF OPERATIONS

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FOR the life insurance executive, an indispensable tool in the decision-making process is the "projection." The proliferation of companies and increased competition for the consumers' dollars have made the need for knowledge and better planning most compelling.

By a "projection" we mean the forecasting of a company's future financial experience. The mature life insurance company is, in some ways, ideally suited to make such a prognostication: mortality is fairly predictable, the investment rate cannot really fluctuate too widely since most investments are long term and for a fixed income, expenses ordinarily do not change rapidly, and, of course, there is generally a large inventory of existing business whose nature has been rather carefully charted. Yet projections, when they are made, are all too often a haphazard thing. With the continuing pressures on profit margins, it has become a vital necessity for companies to plan what they want to happen and to know how they will make it happen rather than to rely on illusory premium redundancies to mitigate errors in judgment.

A projection is called for when life insurance management wonders about:

- a) The necessity for additional corporate financing.
- b) How much the company can afford to invest in new business.
- c) Expanding its operation into new benefit or geographical areas.
- d) Any basic change in field compensation, such as the converting from a general agency to a branch-office operation or vice versa.
- e) The effect of a change in premium rates and/or cash value or dividend structure on profits and taxes.
- f) Decentralizing a company's operation.
- g) The effect of a merger with another life insurance company.
- h) The setting-up of a subsidiary life insurance company.
- i) The utilizing of net operating loss carry-forward deductions.

A projection may also be prepared for:

- a) An investment banking firm as a prerequisite to the raising of new or additional capital.
- b) An investor thinking of buying a substantial interest in a life insurance company.
- c) An insurance department as a prerequisite to licensing or the raising of additional capital.

Very little has appeared in the actuarial literature about life insurance company projections. With this thought in mind, it was felt that the setting-forth of the mechanics of such projections would be useful. This paper will discuss projections for both new and existing companies.

NEW-COMPANY PROJECTION

The organizers of a new life insurance company should be required to prepare a detailed plan of its proposed mode of operation, together with an actuarial projection. While a long-range projection (say, for 10 years) is a mercurial operation at best, it does force some realistic thinking on the entrepreneurs, who, by their very nature, are an optimistic lot. This will help to determine the capital structure of the new corporation so as to insure that there is sufficient surplus to finance the early operation and to preclude the possibility that the company's loss carry-forwards will expire. In addition, the projection will illustrate the results of actions considered by management. It can help management achieve its goal of investing surplus rather than dissipating it.

A new-company projection essentially involves the setting up of a model office and the determination of the concomitant parameters. The various parameters entering into the model office of a new company include, among other things, the following:

- Capital and surplus
- Production
- Distribution of business (new and in force)
- Investment return
- Gross premium rates
- Premium taxes
- Commissions and other field expenses
- General administrative expenses
- Mortality rate
- Morbidity rate
- Persistency rate
- Cash-value basis
- Reserve basis
- Policyholder dividends
- Premium-mode distribution
- Reinsurance cost
- Federal income tax

Varying each of these elements would produce an almost impossible array of possibilities. As a practical matter, many of these parameters are usually set before the projection begins and the net effect of changes determined empirically. Such preset parameters might include commission rates, interest rates, premium taxes, expenses, capital and surplus,

and so forth. The effect of variations in gross premiums, persistency, slope of production, and distribution of business is more difficult to predict. Therefore, separate model offices will frequently be required. Often, "high," "medium," and "low" projections are prepared in order to dramatically illustrate the effect of relatively minor changes in the parameters.

Capital and Surplus

Interest on the capital and surplus account should be kept apart from the insurance operation. These earnings arise because of the initial (and subsequent) investment made by the stockholders and are not part of the earnings arising from the insurance operation. Thus new companies have started with \$100,000, and others have commenced operations with \$10,000,000. It is manifestly unfair to lump them together and examine only the change in surplus without some indication of the surplus level itself. Accordingly, the investment return should be separated into interest on the capital funds and interest on the insurance operation (reserves). Capital gains and losses should also be kept separate from insurance earnings. The surplus (positive or negative) arising from the insurance operation would then be added to the capital funds to produce the annual statement surplus.

Another approach for an investor might be to credit the initial capital funds with interest based on the risk assumed. Thus, risk capital might be considered to earn 10–15 per cent. The stockholders' investment accumulated at an assumed "risk" interest rate can then be compared with the actual capital funds plus the value of the in-force business and the value of the "going concern."

Production

The level and slope of estimated production should be carefully thought out since they have an important bearing on the evaluation of a company's projected operation. Production levels will depend in part on the type of field organization, the amount of money invested therein, the portfolio of policies and rates, and so forth. In recognition that promoters, by their very nature, consciously or unconsciously, tend to overestimate future production and underestimate expenses, some insurance departments request new companies to prepare projections based on a high, medium, and low level of production in order to emphasize the various levels of investment capital which might be required to put the company into the black. Of course, management should be interested in seeing expected results under various levels of production regardless of such outside request.

Composition of New Business

Variations in the composition of new business can be made by plan, issue age, policy size, premium mode, underwriting, percentage substandard, and so forth. As a practical matter, generally only variations in the first two items are employed, combined with the appropriate average policy size for each plan-age combination. A large array of plan-age combinations does not necessarily make for more sensitive results. Different proportions of permanent and term insurance, high early cash value and minimum cash-value plans, par and nonpar insurance, high and low issue ages, will produce significantly different earnings patterns. On the other hand, one plan can sometimes conveniently represent 20-pay life, life at 65, 20-year endowment, and endowment at 65. The validity of this assumption depends on variations in profit levels from plan to plan. The data in the *Life Insurance Fact Book* may be used as a first approximation of the composition of new business. Generally, however, the *raison d'être* underlying the new company will better indicate what pattern of new business might be expected.

Investment Income

In spite of the continuing investment advantage of new money over old money the net investment rate of most new companies is generally below the industry average. The reasons are many: (1) proportionately high liquidity needs, particularly where a negative cash flow exists; (2) a higher proportion of government securities, particularly in order to meet state deposit requirements; (3) unavailability or impracticability of securing the more lucrative investments, that is, direct placements, mortgages; (4) extreme conservatism; and (5) lack of investment astuteness.

The effect of a $\frac{1}{4}$ of 1 per cent variation in investment earnings can be easily calculated since the final projection will set forth the company's projected capital funds and reserves. The interest rate is generally applied to the mean funds available for investment.

Gross Premiums

Variations in nonpar gross premium levels can often be employed with dramatic effect for management. A mere 5-10 per cent increase in whole life gross premium may double profits, and, conversely, a corresponding reduction may almost eliminate them. For simplicity, premiums are often assumed to be collected on an annual basis. The overstatement of premium income is offset to some extent by the overstatement of commissions, premium taxes, and reserves.

Premium Taxes

A flat percentage, say, $2\frac{1}{4}$ per cent, is generally valid for a "broad based" company. A new company, however, generally does most of its business in its home state. Its premium taxes may therefore differ significantly.

Commissions

It is essential to separate commissions and other sales expenses by first-year and renewal, agent, general agent, branch office, expense reimbursement, and so forth. This is particularly true of a company operating in New York, where a significant proportion of the sales compensation in the form of expense reimbursement or development allowances goes into Exhibit 5 of the Annual Statement. The effect of different methods of sales compensation can then be more readily determined. In addition, it facilitates the determination of whether a company licensed in New York will comply with the requirements of Section 213 of the New York Insurance Law. A prospective investor would also want to know whether a company intends to make a heavy investment in agency-financing, whatever the descriptive tag.

Expenses

This is a most difficult figure to estimate. The general expenses of new companies vary widely. Much, of course, depends upon the projected mode of operation. Companies in their first year of operation have had expenses varying from \$100,000 to \$1,000,000. Arthur Pedoe's article (*TSA*, Vol. XIII) and the discussions thereof are an important source of expense rates in the ultimate situation. In the early years, before expenses have reached the going-concern level, discussions with the promoters and the chief executive officers will give some indication of personnel requirements, salary levels, amount of space to be rented, attitudes toward furnishings, and so forth. In any case, a budget should be prepared to show how much will be spent on executive and clerical salaries, furniture, rent, printing, legal, accounting and actuarial fees, advertising, and the rest.

There may be some surprises in store. Since the unexpected expense is to be expected, the projection should so provide. This is particularly true in this day of SEC prospectuses and audits. The projection can also compare anticipated expenses with the expense loading implicit in the gross premium structure. While general expenses will undoubtedly exceed the "amount released" for this purpose, it is worthwhile to constantly ham-

mer home the theme that "excess expenses" come from surplus. Ultimately, the expense level will depend on the quality of management and on the scope and wisdom of their ambitions.

Mortality Rate

Since a new company will take many years to develop a credible mortality experience, industry tables such as the 1955-60 Select Basic Table are frequently used as the underlying mortality assumption in projections. Where appropriate, an adjustment should be made to reflect the higher mortality under nonmedical and "guaranteed issue" business.

Lapse Rate

Lapses are of particular concern for the newer companies although the "minimum deposit" sale and the growth of new companies have made it a problem for almost everyone. The new-company president is generally bombarded by all sorts of agents with all sorts of deals. These "musical chair" agents know how desperate the company is for business. The common requirement is financing, and the common result is a high lapse rate. Since a new company's lapse rate is so crucial a factor and yet so hard to forecast, the actuary is often well advised to illustrate graphically the effect on profits of various persistency levels.

Mr. Buck, in Volume XII of the *Transactions*, presented a lucid study of the characteristics of the policyholder, policy, and agent and their correlation with the first-year lapse rate. Moorhead's excellent treatise on persistency also appears in the same volume.

Reserves

The reserves employed in a projection should provide, where appropriate, for the immediate payment of claims, for nondeduction of deferred fractional premiums, and for the return of the "unearned" portion of the premium in the year of death. In order to minimize early losses, preliminary term reserves are almost always employed, although not necessarily the Commissioners Reserve Valuation Method.

Reinsurance

Reinsurance is an important cost factor since generally a relatively high proportion of a new company's business is reinsured. This is particularly true where companies attract successful producers and the concomitant large policies. The key questions here are: (1) What is the projected retention of the company? (2) What proportion of the business will exceed the company's retention? (3) Reinsurance method? Retention limits should be reviewed periodically and increased as soon as possible.

Federal Income Tax

Since a new company will generally operate in the red for a good many years, prudent management means tax-planning to insure that the loss carry-over benefits can be utilized. This generally means, among other things, the use of minimum reserves and the postponement of depreciation allowances where possible.

Mechanics

In asset share calculations, premiums are generally assumed to be collected at the beginning of the year and terminal reserves set up at year end.

In a projection, premiums can be assumed to be collected at the beginning of the year, at midyear, or at some other point of time, and the appropriate reserves set up. Assuming that premiums are received at the beginning of the year is a relatively simple and straightforward approach but rarely corresponds with reality. The premiums collected by a company generally build up over the year and, therefore, more nearly correspond with a midyear approach. If a new company goes into operation at the beginning of a calendar year, the projection year will correspond with the calendar year, that is, the annual statement. The actuary should always be prepared to explain, however, why the change in surplus as revealed by the annual statement differs from the projection.

A simplified projection of a hypothetical new company has been set forth in the Appendix for illustrative purposes.

EXISTING COMPANY

Projecting the operations of an existing company can be an extremely difficult and frustrating task. The complexity depends on the type of operation that must be projected. Are we talking about:

1. A one-year-old company that may go in almost any direction?
2. A medium-sized company that has been growing rather smoothly and sells only individual life policies?
3. One of the giants of the industry, which operates in all states and sells a broad spectrum of coverages through a variety of agency arrangements?

For an existing company, one of a number of approaches can be used: (1) model office, (2) analysis of operation, or (3) employment of unit profit and cost factors, or an "over-all" method.

Model Office Method

Under this approach, separate model offices are created for the in-force business and for future production. The experiences of both segments are then projected and combined.

A most important first step is the determination of the plan, age and duration elements making up the model office. To keep the model office within manageable proportions, only those plans that are truly indicative of the in force should be used. The validity of the model office of existing business is measured by whether it reproduces the financial experience of the company. This is a necessary but not sufficient condition.

A projection of earnings on an existing closed block of business is essentially a transformation (producing earnings year by year instead of discounting) of a gross premium valuation, and such a valuation must be based on assumptions which reflect past experience. All the accouterments of a new-company projection are present here (mortality rate, interest rate, lapse rate, commission rate, expenses, etc.), except that we are concerned with an additional dimension—duration. Thus, each block consists of sub-blocks, each with its own premium rate structure.

Some sub-blocks are profitable, some are not. Some sub-blocks are associated with particular forms of agency organization or contracts or with particular underwriting policies or both and may have a distinctive experience which would need to be recognized. A projection of earnings on a closed block can be extremely time-consuming, requiring a fairly exhaustive actuarial, financial, and functional analysis of past operations and then a complex and sophisticated set of projections.

The projection of earnings on the new-business model office can be handled in a fashion similar to a new-company projection with one major difference—the various parameters entering into the projection (production estimates, plan and age distribution of business, lapse rates, etc.) can be generally estimated with a far greater degree of success.

Expenses can be projected using the results of periodic budget studies and/or a functional analysis. In the former case, one expense estimate is made for both the new and existing business. In the latter case, separate projections are made and then combined.

The model office approach is essentially an asset share approach and, as such, enjoys its advantages and suffers from its shortcomings. Theoretically, we may probe many years into the future. Practically, this is (a) difficult because of the immense work required (even with electronic equipment) to deal with the multitude of parameters and (b) virtually unattainable because the actuary is not omniscient and can only project and extrapolate. The model office approach does show what will happen if certain assumptions are met and the effect of changes in various parameters. With discretion and judgment, it is a most powerful tool.

Analysis of Operation Method

In the "analysis of operation" approach, a company's financial experience is reviewed, analyzed, and projected. Essentially, this involves an examination of each line of "page 5" of the Annual Statement and the forming of relationships and patterns.

Thus, for a smaller company:

- a) Renewal premiums can generally be expressed as a percentage of the previous years' total premiums.
- b) Investment income can be related to the previous years' return and the growth of assets.
- c) Claims might be expressed as a function of expected claims or "tabular cost." It should be noted, however, that the "analysis of increase in reserves" produces a cost of mortality based on net amount at risk rather than expected gross death claims.
- d) The increase in reserves can sometimes be expressed as separate percentages of first-year and renewal premiums. Alternatively, average reserve per \$1,000 factors can be applied to blocks of projected in-force business. Sometimes, the "tabular cost" is estimated and the reserves calculated as a by-product.
- e) Commissions can be expressed as a percentage of premiums, treating first-year, single, and renewal premiums separately.
- f) Taxes can be expressed as a percentage of premiums.
- g) Expenses are broken down in accordance with Exhibit 5 and various relationships formed. The key item is salaries, which must be carefully analyzed. This may be done in bulk or individually, depending on the size of the company. The other items are then individually examined or related to salaries, sales, insurance in force, premium income, or combinations thereof. These items will generally come directly from the company budget for the ensuing year.
- h) First-year premiums are difficult to estimate. Although they are more than offset by directly allocated items (new-business compensation, underwriting costs, sales expenses, first-year claims), an error in their estimation could be embarrassing where net level reserves are set up.

The "analysis of operation" is a fairly crude method and can generally be used only for probing into the immediate future. It is essentially an extrapolation technique, and therefore where required has the accompanying advantage of producing fast results. By its very nature, however, it does not help the analyst to understand what is happening.

The "analysis of operation" approach is often an extension of the annual budget forecast. Since the estimation of expenses is generally the most time-consuming task, it is a most natural appendage.

Over-all Method

In the over-all approach, a company's gain from operations as set forth by the Annual Statement is broken into (a) first-year cost, (b) renewal profit, (c) one-time nonrecurring gains or losses, (d) corporate items, and thereafter projected.

First-year cost—sometimes called new-business strain—is the cost of putting new business on the books and is equal to first-year home office expense plus first-year sales cost plus first-year mortality cost plus the loss of interest in the first year plus first-year reserves minus first-year premiums. In essence, the first-year cost (or first-year investment in new business) is equal to the total first-year cost in excess of first-year premiums. The loss of interest on the surplus investment in new business should not be ignored.

Renewal profit is the net profit accruing to the company from the renewing business. It is the earnings the company would realize if there were no investment in new business. Thus, a \$200,000 gain from operations may mask a \$500,000 gain from renewal operations and a \$300,000 investment in new business. The sum of "first-year cost" plus "renewal profit" should equal the company's financial experience (after adjusting for one-time and corporate items).

One-time nonrecurring items would include past-service pension contributions, capital gains or losses, costs inherent in a conversion to a new mortality table, correction of a previous financial statement, and reserve strengthening.

Corporate items would include interest on the company's capital and surplus, cash and stock dividends, and the sale of stock, whether through a financial underwriting, the picking-up of stock options, or some other means. The granting of stock options generally results in a dilution of a stockholder's interest and, as such, should be indicated in a projection.

Proceeding with the over-all approach, we would:

1. Segregate the company's financial operation into the above four classifications. Actually, "one-time" and "corporate" items are fairly self-evident, so that the prime task is the division between new-business cost and renewal profit.

The income and disbursement items might be broken into the following categories:

- a) Nonexpense items directly or readily chargeable to first year and renewal. These would include premiums, commissions, premium taxes, investment income, policyholder benefits, increase in reserves.
- b) Expense items directly or readily chargeable to first year and renewal. These would include medical fees, inspection reports, auditing fees,

agency expenses, and so forth. In addition, there would be salaries and overhead which can be directly allocated: agency, underwriting, issue, and policyholder service.

- c) *Items not readily allocable.* These would include a whole mass of items (generally expenses) which cannot be readily allocated. These expenses are generally allocated in proportion to first-year and renewal premiums, number of policies of insurance in force, salaries, or combinations thereof. This split is a very fluid one. It must be tempered with common sense and checked to see that it reproduces the company's expenses.

One oversimplified approach would be to:

- i) allocate all clerical and supervisory salaries which can be readily segregated;
 - ii) break down all the remaining (*nonexecutive*) salaries in proportion to first-year and renewal premiums;
 - iii) allocate all expense items which can be readily segregated; and
 - iv) break down in proportion to i and ii above executive salaries and general expenses which cannot be directly allocated.
2. While it is possible to project both "first-year cost" and "renewal profit" in total, it is generally more feasible to relate these items to some base which can then itself be projected. Face amount and premiums are the two most common denominators. The relating of "first-year costs" and "renewal profit" to a base generally gives a more meaningful result and is particularly useful for long-range projections. Thus, a progression of historical first-year costs takes on an added dimension when it is related to the amount of new business written. The same consideration applies to renewal profit.

Generally, it makes little difference whether our denominator is gross or net with respect to reinsurance. This may not be true of some of the newer companies, where a significant portion of the business is reinsured (particularly with respect to premiums under a coinsurance agreement).

Dividing first-year cost by new-business production gives us first-year surplus drain per \$1,000. Dividing renewal profit by the business (in force beginning of year less one half of the previous year's production) producing this profit gives us the renewal profit per \$1,000. A historical series of "new-business strain per \$1,000" and "renewal profit per \$1,000" factors can be prepared. These factors are then extrapolated into the future. Thus, projecting future production and in force, one-time and corporate items enables us to estimate future profits (or losses). Alternatively, first-year costs and renewal profits can be related to premiums.

3. Alternatively in 1, c, we can try to work with the large mass of nonallocable expenses directly. Thus we would project:
- a) Preliminary first-year cost per unit (before nonallocable items are taken into account). These preliminary first-year cost figures will be lower than the true first-year costs.
 - b) Preliminary renewal profits per unit (before nonallocable items are taken

into account). These preliminary renewal profit figures will be higher than the true renewal profits.

- c) Nonallocable items.
- d) Proceeding along this tack, we would:
 - i) define and determine nonallocable expenses for the past years and separate them out;
 - ii) divide such adjusted company earnings between first year and renewal;
 - iii) develop a historical series of unit-adjusted renewal earnings and project the series forward;
 - iv) apply the unit-projected adjusted renewal earnings to projected old business treated as a closed block;
 - v) develop a model office projection of earnings on future business before allowance for nonallocable expenses; and
 - vi) make a separate en masse projection of nonallocable expenses for the combined closed and future block, after studying the historical trend of the major components of nonallocable expense in relation to total in force and total new production as well as relevant aspects of company history.

The over-all method is relatively simple and can be worked out rather quickly. It has the advantage and disadvantage of lumping together, into one average figure, the results of all kinds and types of business. A minimum number of assumptions are made. It can analyze a company's past and present operations. A historical series of renewal profits per \$1,000, or per dollar of renewal premium, can be developed without too much trouble. As a budgetary operation it is excellent and, as such, will indicate how much is available for acquisition. As a method of prediction, it is attractive but dangerous—by its very nature, it hides many cross-currents. It does not indicate the future value of current business. It does not explain why the results are as they are or what would happen if certain factors were changed.

SUMMARY

Life insurance management, in line with management generally, must make full use of all the equipment at its disposal. One of its most valuable tools is the projection of operations. It is an approach which seeks to force greater realism and thus to "substitute facts for appearances and demonstrations for impressions."

Three broad methods (model office, analysis of operation, and over-all) were described and a detailed example of a model office for a new company was presented. This paper will only succeed in its purpose if it will elicit comments, criticism, and contributions on a tool that, while in increasing use, has received far too little discussion.

APPENDIX
PROJECTION OF A NEW LIFE INSURANCE COMPANY

TABLE 1
CALENDAR-YEAR ASSUMPTIONS

Calendar Year*	Production†	Earned Interest Rate	General Expenses	Per Cent of Production Reinsured (4a)	Amount of New Reinsurance (4b)	Premium Tax Rate (5)
	(1)	(2)	(3)		(4b)	(5)
1.....	\$25,000,000	3.50%	\$325,000	25%	\$6,250,000	2.25%
2.....	30,000,000	3.75	375,000	23	6,900,000	2.25
3.....	35,000,000	4.00	425,000	21	7,350,000	2.25
4.....	40,000,000	4.00	475,000	20	8,000,000	2.25
5.....	45,000,000	4.00	525,000	19	8,550,000	2.25

* It is assumed that the company commences operation on January 1.

† Production is assumed to be uniformly distributed throughout the year.

TABLE 2
POLICY-YEAR ASSUMPTIONS

Policy Year	Mortality Rate per \$1,000*	Lapse Rates†	Reinsurance (YRT) Premium‡ per \$1,000	Net Amount at Risk§	Reinsurance Cost|| per \$1,000
	(1)	(2)	(3)	(4)	(5)
1.....	\$0.79	25.0%	\$1.50	\$1,000.00	\$0.71
2.....	0.99	15.0	2.03	995.55	1.04
3.....	1.25	12.5	2.50	982.90	1.23
4.....	1.44	11.0	2.78	968.00	1.30
5.....	1.63	10.0	3.05	952.85	1.35

* Issue age 35, 1955-60 Select Basic Table—Male and Female Lives Combined (*TSA, 1962 Reports*, p. 46).

† Lapse: Rates are derived from Linton's tables, B and C.

‡ Reinsurance premiums are based on the rates of several large reinsurers.

§ \$1,000—Table 5, B, col. (5).

|| [Col. (3) — col. (1)] × col. (4).

TABLE 3
SERVICE TABLES PER MILLION OF ISSUE

YEAR	BY POLICY YEAR				BY CALENDAR YEAR			
	In Force Beginning of Year	Deaths*	Lapses†	Reinsurance Cost‡ per Million Ceded	In Force Beginning of Year	Deaths§	Lapses||	Surrender Cost¶ per Million of Issue
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	\$1,000,000	\$790	\$250,000	\$710.00	.....	\$395	\$ 0	\$ 0
2	749,210	742	112,382	779.18	\$999,605	766	250,000	0
3	636,086	795	79,511	782.39	748,839	769	112,382	500.10
4	555,780	800	61,136	722.51	635,688	798	79,511	1,359.64
5	493,844	805	49,384	666.69	555,379	803	61,136	1,956.35
6	443,655	.....	.....	.....	493,440	.....	.....	.....

* Table 2, col. (1) × col. (1) of this table. Deaths are assumed to occur throughout the year.

† Table 2, col. (2) × col. (1) of this table. Lapses are assumed to occur at the end of the year.

‡ Table 2, col. (5) × col. (1) of this table.

§ $\frac{1}{2}$ [col. (2)-1 + col. (2)].

|| Col. (3)-1.

¶ Table 5, B, col. (5)-1 × col. (7) of this table.

TABLE 4
PLAN ASSUMPTIONS

Plan (1)	Plan Distribution (2)	Cash-Value Basis	Reserve Basis	Average Size (5)	Premium* per \$1,000 (6)	Policy Fee per \$1,000† (7)	Weighted Premium‡ per \$1,000 (8)
		(1958 CSO, 3½ Per Cent) (3) (4)					
Whole Life	50%	Minimum	Graded§	\$10,000	\$17.25	\$1.00	\$ 9.13
20-Pay Life	10	Minimum	CRVM	6,000	26.10	1.67	2.78
RI at 65—Male.	15	Minimum	CRVM	5,000	36.85	2.00	5.83
5-Year R+C Term	25	.....	CRVM	25,000	5.30	0.40	1.43
Total weighted average . . . . .	.....	.....	.....	.....	.....	.....	\$19.17

* Typical nonparticipating premiums of the newer life insurance companies.

† \$10 policy fee ÷ col. (5).

‡ Col. (2) × [col. (6) + col. (7)].

§ CRVM in the first-year grading to the net level reserve in the twentieth year.

TABLE 5
VALUES PER PLAN

Policy Year	Whole Life (1)	20-Pay Life (2)	RI at 65— Male (3)	5-Year R+C Term (4)	Weighted Average per \$1,000 (5)
A. Commissions*					
1.....	90.0%	85.0%	75.0%	70.0%	\$15.95†
2.....	12.5	12.5	7.5	7.5	2.03†
3.....	7.5	7.5	7.5	7.5	1.44†
4.....	7.5	7.5	7.5	7.5	1.44†
5.....	7.5	7.5	7.5	7.5	1.44†
B. Cash Values per \$1,000‡					
1.....	\$ 0	\$ 0	\$ 0	.....	\$ 0
2.....	0	10	23	.....	4.45
3.....	11	32	56	.....	17.10
4.....	26	55	90	.....	32.00
5.....	41	79	125	.....	47.15
C. Mean Reserves per \$1,000‡					
1.....	\$ 1	\$ 1	\$ 9	\$1	\$ 2.20
2.....	15	23	40	2	16.30
3.....	29	45	72	2	30.30
4.....	44	67	105	2	44.95
5.....	58	90	139	2	59.35

* All business is assumed to be sold through the general agency system. Where appropriate the sales costs should be broken down into commissions, override, expense reimbursement, development allowance, and so forth.

† Commission dollars. Table 4, col. (8), weighted by commission percentages for each plan.

‡ See Table 4 for bases.

TABLE 6
ITEMS BASED ON PREMIUM PAYING IN FORCE

POLICY YEAR	CALENDAR YEAR				
	1	2	3	4	5
A. Premium Paying In Force (In Force Beginning of Policy Year;* 000 Omitted)					
1	\$ 25,000	\$ 18,730	\$ 15,902	\$ 13,895	\$ 12,346
2		30,000	22,476	19,083	16,673
3			35,000	26,222	22,263
4				40,000	29,968
5					45,000
Total	\$ 25,000	\$ 48,730	\$ 73,378	\$ 99,200	\$ 126,250
B. Premiums Paid†					
1	\$479,250	\$359,054	\$ 304,841	\$ 266,367	\$ 236,673
2		575,100	430,865	365,821	319,621
3			670,950	502,676	426,782
4				766,800	574,487
5					862,650
Total	\$479,250	\$934,154	\$1,406,656	\$1,901,664	\$2,420,213
Premium taxes.....	10,783	21,018	31,650	42,787	54,455
C. Commissions‡					
1	\$398,750	\$ 38,022	\$ 22,899	\$ 20,009	\$ 17,778
2		478,500	45,626	27,480	24,009
3			558,250	53,231	32,059
4				638,000	60,835
5					717,750
Total	\$398,750	\$516,522	\$ 626,775	\$ 738,720	\$ 852,431

* Each item of Table 1, col. (1) × Table 3, col. (1).

† Average weighted premium of \$19.17 from Table 4, col. (8), applied to Table 6, A; premiums are assumed to be paid annually.

‡ Table 5, A, col. (5), applied to horizontal elements of Table 6, A.

TABLE 7
ITEMS BASED ON SERVICE TABLES

POLICY YEAR	CALENDAR YEAR				
	1	2	3	4	5
A. Death Claims*					
1.....	\$ 9,875	\$ 19,150	\$ 19,225	\$ 19,950	\$ 20,075
2.....		11,850	22,980	23,070	23,940
3.....			13,825	26,810	26,915
4.....				15,800	30,640
5.....					17,775
Total....	\$ 9,875	\$ 31,000	\$ 56,030	\$ 85,630	\$ 119,345
B. Reinsurance Costs†					
1.....	\$ 4,438	\$ 4,870	\$ 4,890	\$ 4,516	\$ 4,167
2.....		4,899	5,376	5,398	4,985
3.....			5,219	5,727	5,751
4.....				5,680	6,233
5.....					6,071
Total....	\$ 4,438	\$ 9,769	\$ 15,485	\$ 21,321	\$ 27,207
Adjusted rein- surance cost‡.....	2,219	7,104	12,627	18,403	24,264
C. Surrender Benefits§					
1.....	\$ 0	\$ 0	\$ 12,503	\$ 33,991	\$ 48,909
2.....		0	0	15,003	40,789
3.....			0	0	17,504
4.....				0	0
5.....					0
Total....	\$ 0	\$ 0	\$ 12,503	\$ 48,994	\$ 107,202

* Table 1, col. (1), applied to Table 3, col. (6).

† Table 1, col. (4b) applied to Table 3, col. (4).

‡ Mean of t th and $(t - 1)$ th calendar-year reinsurance costs adjusts for increase in unearned premium reserve.

§ Table 1, col. (1), applied to Table 3, col. (8).

TABLE 8

RESERVES

YEAR	CALENDAR YEAR				
	1	2	3	4	5
A. Insurance in Force at End of Calendar Year* (000 Omitted)					
1.....	\$24,990	\$ 18,721	\$ 15,892	\$ 13,884	\$ 12,336
2.....		29,988	22,465	19,071	16,661
3.....			34,986	26,209	22,249
4.....				39,984	29,954
5.....					44,982
Total....	\$24,990	\$ 48,709	\$ 73,343	\$ 99,148	\$ 126,182
B. Reserves†					
1.....	\$54,978	\$305,152	\$481,528	\$ 624,086	\$ 732,142
2.....		65,974	366,180	577,851	748,912
3.....			76,969	427,207	674,145
4.....				87,965	488,250
5.....					98,960
Total....	\$54,978	\$371,126	\$924,677	\$1,717,109	\$2,742,409
Adjusted for immediate payment of claims‡....	55,940	377,621	940,859	1,747,158	2,790,401
Increase in re- serves.....	55,940	321,681	563,238	806,299	1,043,243

* Each item of Table 1, col. (1) × Table 3, col. (5).₁

† Table 5, C, col. (5), applied to horizontal elements of Table 8, A.

‡ 1.0175 × each total.

TABLE 9—SUMMARY OF OPERATIONS

ITEM No.	ITEM	SOURCE	CALENDAR YEAR					
			1	2	3	4	5	
1	Insurance operations:							
2	Premiums:							
3	First-year Renewal	Table 6, B	\$ 479,250	\$ 575,100	\$ 670,950	\$ 766,800	\$ 862,650	
3	Investment income from ins. oper.	Table 6, B $\frac{1}{2}[(1)+(2)+(12)-(13)]$ $+(15)_{-1}+(22)_{-1}$	0	359,054	735,706	1,134,864	1,557,563	
4	Total income	Items (1) to (3)	\$ 474,571	\$ 923,643	\$ 1,399,535	\$ 1,908,942	\$ 2,452,375	
5	Disbursements:							
6	Death claims	Table 7, A	\$ 9,875	\$ 31,000	\$ 56,030	\$ 85,630	\$ 119,345	
7	Reinsurance costs	Table 7, B	2,219	7,104	12,627	18,403	24,264	
7	Surrender benefits	Table 7, C	0	0	12,503	48,994	107,202	
8	Commissions:							
9	First-year Renewal	Table 6, C	398,750	478,500	558,250	638,000	717,750	
10	General expenses	Table 6, C	0	38,022	68,525	100,720	134,681	
11	Premium taxes	Table 1	325,000	375,000	425,000	475,000	525,000	
12	Increase in reserves	Table 6, B Table 8, B	10,783 55,940	21,018 321,681	31,650 563,238	42,787 806,299	54,455 1,043,243	
13	Total disbursements	Items (5) to (12)	\$ 802,567	\$ 1,272,325	\$ 1,727,823	\$ 2,215,833	\$ 2,725,940	
14	Gain	(4) - (13)	\$ - 327,996	\$ - 348,682	\$ - 328,288	\$ - 306,891	\$ - 273,565	
15	Insurance operation earned surplus	(15) ₋₁ +(14)	\$ - 327,996	\$ - 676,678	\$ -1,004,966	\$ -1,311,857	\$ -1,585,422	
16	Capital funds:							
17	Contributed	\$2,500,000	0	0	0	0	0	
18	Interest	*X(18) ₋₁	87,500	97,031	107,381	111,676	116,144	
18	Accumulated capital funds	(18) ₋₁ +(17)	2,587,500	2,684,531	2,791,912	2,903,588	3,019,732	
19	Annual statement capital and surplus	(15)+(18)	2,259,504	2,007,853	1,786,946	1,591,731	1,434,310	
20	Issue (000 omitted)	Table 1	25,000	30,000	35,000	40,000	45,000	
21	In force (000 omitted)	Table 8, A	24,990	48,709	73,343	99,148	126,182	
22	Reserves	Table 8, B	55,940	377,621	940,859	1,747,158	2,790,401	

DISCUSSION OF PRECEDING PAPER

ELLIS D. FLINN:

I would like to thank Mr. Gold for writing this paper. The problem of projecting company earnings is one which is certainly encountered frequently by actuaries today, yet one which has received scant attention in actuarial literature. Insurance company management is coming more and more to the realization that a forecast of probable future earnings—the more reliable the better—is essential to sound planning. Third-generation computers have made it possible to refine the projection process by making it practicable to introduce many more factors into the calculation. And, although in the past the work involved in a careful projection was so time-consuming that the effect of varying one or more assumptions was left to the judgment of the management team, it is now possible to run off “high” and “low” forecasts, thereby reducing considerably the judgment area. The availability of electronic computers, together with the increasing pressure of competition, is probably responsible for the increasing interest in projections.

The purposes for which a projection can be used are well set out by Mr. Gold. But the mere making of a projection showing a satisfactory profit position does not guarantee the success of a company. Management must understand the assumptions on which the projection was based. In a sense a projection is a budget of such items as production level, overhead expense, mortality and lapse rates, and so forth, and, like any other budget, management must exercise control to make it work out.

Of the three methods outlined I believe that the model office method is far superior, especially for longer term projections. My remaining comments are about this method.

The sample projection in the Appendix was presented as a simplified projection and, therefore, did not take all things into account. In actual practice, additional factors would be introduced, among which, it seems to me, should be those discussed in the following paragraphs.

1. Each plan should be projected separately. This makes it possible to take account more accurately of the different volume and rates of mortality, lapses, expenses, and amount of reinsurance ceded that affect each plan. Reinsurance, for example, would tend to be understated when plans are grouped, since reinsurance will tend to be mainly on the whole life and term plans, where the amount at risk is greatest.

2. Premium mode should be taken into account. The effect of taking

premium mode into account is to reduce the total premium collected, since not all policies will be paid until the end of the policy year. Especially when results are adjusted to a calendar-year basis, we have found that recognition of the mode can make a significant difference, and it is the calendar-year basis which is of greatest usefulness to management.

3. In spite of the many pitfalls of a long-term projection, a projection should be carried out far enough for a company to see whether early losses will be offset by later projected profits and to aid in tax planning to take full advantage of loss carry-overs.

4. For a new company, I prefer, for competitive reasons, to use the assumed ultimate expense rates in the asset share calculation and from a budget forecast to estimate the excess expenses before these ultimate rates are achieved. This should enable the company to recognize and control expenses in excess of the competitive level (another form of surplus strain) and to reduce this excess each year. In addition, the company should set a time limit on the period in which it expects to operate in excess of ultimate costs.

In Mr. Gold's review of the discussion I would ask him to explain the rationale behind a decreasing proportion being reinsured each year. With capital and surplus falling, it seems unlikely that the retention limit would be raised.

ABRAHAM HAZELCORN:

Mr. Gold is to be commended on this contribution to the actuarial literature. Having made the projections for new insurance companies described by Mr. Gold, we at Lybrand, Ross Bros. & Montgomery cannot emphasize too strongly some of the warnings included in Mr. Gold's paper. He has reflected the requirements for submission of financial projections of at least two important insurance departments.

In our first assignment involving a report including financial projection, we were told that the main purpose of the ten-year projection is to "inform ignorant management" of the operating results of a life insurance company. This point cannot be overstressed. As Mr. Gold has stated, management of new companies is composed of optimists. Putting aside those who think in terms of stock manipulation, many a knowledgeable businessman who becomes a director of a life company does not appreciate the basic progress in the operating results of a well-managed life company.

It is important to note that the projection should not be viewed as merely the satisfaction of a state requirement. While it is not possible to know the complexion of business which is to be sold and expenses of a company not yet licensed, the projection can have future use. In our

transmittal letter to the superintendent or commissioner of insurance, we state that it is our intention to use the submission as a basis for future planning. It should be possible to explain the major deviations after the first year of operation from the results of the required insurance department projections. In addition, complaints will arise if these actuarial assignments are viewed merely as a *pro forma* satisfaction of a step in licensing.

The description of the new company's plan of operation and the interpretation of financial projections are important parts of the submission. An insurance department is concerned with the caliber of a prospective insurer even if it has no foreseeable financing problem. It therefore may be properly interested in the insurance talents and the personal integrity of the individual promoters and management personnel.

While the Appendix is illustrative only, I would like to make some comments on the assumptions. The idea of separating interest on the capital-and-surplus account from the insurance operation is a good one. In the extreme case a company could be misleading its stockholders because the interest on a huge initial capital and surplus may exceed the operating loss. Talk of "operating in the black" the first year would probably be meaningless. Some jurisdictions require a division between capital and surplus. The arithmetic of Table 9 would not change, but the division is important to ascertain the timing of the need for additional financing.

The production assumption in Table 4 contains 25 per cent term insurance. Most new companies experience a much higher percentage. We have shown a projection based on several ages at issue instead of one age. If that one age is 35, there may be a distortion since we have discovered very low margins in the premium at 35. For a mortality rate it may be necessary to assume a percentage of female lives and a percentage of substandard lives.

An excellent source of data for companies organizing in New York is the *New York Insurance Report*. Portions of the annual statements of companies authorized to do business in New York are displayed. Pages 2, 3, and 4 of the NAIC blank are shown along with Exhibits 5 and 8, Schedule G, the Policy Exhibit, and part of Schedule M if the company is a mutual. If the background data of other recently formed companies are known, the general expenses can be modified appropriately and use can be made of the information for projections.

E. J. MOORHEAD:

The aim of this discussion is to supplement Mr. Gold's observations about the usefulness of projections.

How many actuaries can let their projections speak to them and then act with confidence on what the projections tell them? Very few, I fear.

We simply have not mastered the art of devising factors, particularly expense factors, that are genuinely true to life. For example, when we say that a particular category of first-year expense can be expressed as, say, \$30 per policy, we are saying that that expense will double if the number of policies doubles and will be cut in half if the number of policies is reduced by half. The significant but elusive fact is that the relationship between the quantity of items handled and the cost of handling is much more complex than that. Now that we are in an era of computer elasticity, let us not cling to approaches that belong to the much more restricted era of desk calculators.

A question on which more work is greatly needed is that of how to handle what is often loosely called "overhead expense" and sometimes is misleadingly labeled "fixed expense." One recent explorer in this particular jungle is Professor James S. Hekimian, of Massachusetts Institute of Technology, in his book *Management Control in Life Insurance Branch Offices* and in his paper entitled "A Profit Calculation for Agency Management" (*Journal of Risk and Insurance* [March, 1966]).

My personal belief is that Hekimian's analysis is in some respects impractical and that he has carried his theory of variable versus fixed costs beyond the boundary of what is reasonable. I would be interested to hear from actuaries who have studied what the Professor has done and who either agree or disagree with the opinion here expressed.

If the Society is to have workshops at future meetings—and I hope that it will—may I suggest one worthy topic: "How Can We Create Projections and Asset Shares That Will Reliably Tell Us What We Need To Know?"

WILLIAM J. NOVEMBER:

As usual, the author has done a service in focusing attention on a problem of substantial current interest, particularly as it relates to new companies. Methods for making projections are very much in a stage of development, and we can all profit from pooling our thoughts on the subject.

As I see the problem, the form of the projection and the effort put into it depend very much on the purpose served and the information available for the projection. This might have been emphasized by the author before jumping into a description of a new-company projection, and, if he had done so, I believe that the presentation might have taken a different turn.

The situation for a company in the process of formation is quite different from that of a company in existence for a few years and alto-

gether different from that of a well-established company. Each of these types forms a separate category, really, and the projection procedure generated by the actuary will be related to the situation with which he is dealing.

For the companies in the process of formation, a projection of the financial results that might be anticipated is highly important to prospective investors and to supervisory authorities who are faced with the responsibility for granting licenses to new companies. The New York Insurance Department deserves credit for making a financial projection a prerequisite to its consideration of a new license application.

It is unfortunate that in this situation the projection factors are all conjectural, since there is no experience to go on except what has happened in other new companies. The result is hardly a substitution of facts for appearances, but, if a good job is done, it can be a valuable guide to capitalization and budget-planning.

The projection need not be the tool for arriving at decisions concerning such matters as gross premium levels and type of agency organization, as seems suggested by the author. In fact, it is more likely that preliminary studies will be made to enable the entrepreneurs to establish premium levels, the form and scale of agency compensation, the method and extent of reinsurance, and so forth, and that these studies will then provide the means for developing an over-all projection. If the preliminary studies are in the form of profit-margin projections at typical ages for the basic plans of insurance contemplated, the projection can take the form of a synthesis of the results for the various plans and ages by means of a model office assumption and the application of the anticipated levels of future production.

In this process the model office would not be applied to develop average factors for the company as a whole but would be used to bring together the results for the individual policies as determined by the factors deemed appropriate for them. I believe that this is a better approach to developing the over-all picture, aside from the inherent advantage that it has in revealing the *why* of the over-all results.

With modern electronic machinery, the projection is a natural extension of the preliminary studies, which should be undertaken anyway. Some adjustments will be required, such as for the extra "tooling up" costs of the early years and the investment income to be anticipated from the capitalization, but these should present no serious problems. A shift to a calendar-year basis is a complication that has to be planned for if the preliminary studies are on a policy-year basis. This can be avoided by using a calendar-year structure throughout.

Moving now to companies in their early years of operation, we see that projections serve the important purpose of keeping such companies posted on their future capitalization needs. Careful planning of additional capital is necessary, for obvious reasons, so projections of operations are worth a bit of trouble. Fortunately, experience factors will have begun to emerge and production levels will be more than a guess. The whole problem can be tackled with more assurance as to the significance of the results. The basic approach is likely to be that suitable for companies in the process of formation but with a refinement of factors in light of some actual experience.

An interesting purpose that can be served at this stage of a company's development is to provide a basis for a decision on electing the level premium reserve basis under Section 818(c) of the federal income tax law. Whenever such an election is made, the adjustment of the reserve on outstanding business from a preliminary term to a net level basis is lost as a charge against operating results. The sooner the election is made, therefore, the smaller will be the loss. On the other hand, if operating losses of the early years are of such size as to leave in doubt the company's capacity to take full advantage of them through the income tax law's loss-carry-forward provisions, there is no point to adding to the losses. An analysis of what the future holds in the way of operating losses then becomes good tax management.

As has already been mentioned, the well-established companies are in an altogether different situation regarding projections of operations. Their purposes will not be as vital as those for new companies. Projections will normally be wanted in connection with setting company objectives and with planning future operations. The information available for the projections is, of course, much more plentiful.

A company that has been in business for some time is likely to have blocks of business on different premium and actuarial bases. The model office method for projecting the results on business already in force can be quite cumbersome, as the author has brought out. Yet this may be the preferred method for future business. Hence the use of two different methods might be the logical procedure. The purpose of the study should dictate the amount of effort that goes into the job, and I suspect that it will not be as great, relatively, as it is in the case of projections made for new companies.

MEL STEIN:

Mr. Gold is to be congratulated for having written a badly needed nontechnical survey paper on this extremely important topic.

Mr. Gold describes three methods of making projections for an existing

company. I will now briefly outline a fourth approach, which is somewhat related to Mr. Gold's model office approach. A detailed calendar-year gross premium valuation is made for business in force and for current sales. This is based upon two separate model offices. At the same time a budget of company expenses is projected.

The following results will then be projected for each of the individual years covered by the projection:

1. Renewal book profits from insurance in force during the year.
2. First-year investment in new business.
3. The amounts of the major elements that determine the book profits.
4. The amount of insurance in force.
5. The value of insurance in force, determined as the present value of the future book profits expected from this insurance. These values will, of course, be greatly influenced by the yield rates used to discount the book profits.
6. The portion of the company's total expenses not absorbed by the insurance issued and in force during the year. This can be a substantial portion of expenses in the case of a small, young company.
7. The annual statement profit, which is the sum of
 - a) book profits from insurance issued and in force during the year,
 - b) earnings on noninvested surplus and capital,
 - c) expenses not absorbed by the insurance issued and in force (negative), and
 - d) miscellaneous sources of income such as those mentioned by Mr. Gold.
8. The real profit of the company, which is the sum of
 - a) the annual statement profit, and
 - b) the increase in the value of the insurance in force during the year.
9. The value of the agency force at the end of the year. As there is more than one approach that may be taken in accomplishing this, I will only say that there is no one correct value. However, if a sound valuation procedure is consistently followed every year, valuable information is made available to management and stockholders.
10. The going-concern profit of the company during the year. This is the sum of
 - a) the annual statement profit,
 - b) the increase in the value of insurance in force, and
 - c) the increase in the value of the agency force.

I would again like to stress that there is no one correct value to be placed on a company's insurance in force and agency force. However, a consistent approach using the same discount rate provides invaluable information regarding a company's true performance.

Projections for a new company are interdependent with the company's gross-premium structure. The following procedure is recommended for making projections and determining gross premiums for a new company.

1. Based on the proposed market, desired general competitiveness of gross premiums, and sales vehicle, a ten-year projection is made of sales and insurance in force. It is understood that low, most likely, and high sales projections may be made.
2. A ten-year projection of expenses is then made for each sales projection.
3. Gross-premium calculations will then be made using different ultimate expense levels. Each set of gross-premium rates will be based on different amounts of expense assumptions and will be used to project the amount of expense implicitly provided for in the gross-premium structure. This, in turn, will show management the decreasing amounts of projected expense which will not be absorbed by the gross-premium structure under the company projections. This unabsorbed expense is really an additional investment by the stockholders.

Thus, the final choice of premiums will be determined by the weight management places on (a) competitiveness of premiums, (b) ultimate profitability of premiums, (c) additional investment of stockholders, and (d) the period when these additional investments will no longer be required.

No comment is made on Mr. Gold's numerical example as it obviously was meant to be a crude illustration rather than a refined technical model of a projection. I would again like to commend Mr. Gold for his straightforward and timely paper on this important subject.

IRWIN T. VANDERHOOF:

I think that the members of the Society owe a continually increasing debt to Mr. Gold for his series of papers on the business aspects of insurance. Budgets and projections of operations are standard tools of management in most businesses, but sometimes we may become too concerned with our mathematical profundities and ignore this. Except for the model office approach, there is little that I can find in the literature that indicates any handling of projections of operations. It seems to me very good for the business that Mr. Gold has remedied this lack.

My comments cover an observation on the logical relationship among the three types of projections discussed, an opinion about the usefulness of different types of projections, some other references in this general area that I have come across, and the discussion of the experience of Standard Security Life, with its use of projections since its inception in 1959.

Logically, it seems to me that these different mathematical approaches toward projections are not so distinct and different as they might appear. After all, our conventional model office approach simply represents many policies by a relatively smaller number of policy age groupings. The

analysis of operations approach simply combines all the commission, all the premium items, and so forth, that might appear in a model office into large aggregates of the type that appear in the annual statement form. If we simply did a summation of the items in our model office, we should end up with an analysis of operations approach and should logically get the same answer. Similarly, if the analysis of operations items are grouped, we obtain the so-called over-all method as a result of the grouping. From this, it seems to me to follow that, if the underlying data and assumptions are equally good, there is no clear-cut choice, on the basis of the final result, of one method over the other. They all start with a model office and end with a statement of profit or loss. The only question is how the aggregates are summed before or after the projection is done. In the model office the summation is after the projection of the various cells; in the other approaches the summation is done before the projection.

This logically leads to a second point which is perhaps more important, and that is the appropriate basis for choice among the different methods. It is obvious that the model office approach involves very considerable amounts of work, as compared to the other two. This is not a final argument, however, if the model office approach has advantages under some circumstances. I believe that it does, depending on the question one is asking. If you are asking a question about the effect on future profits of a change in the mix of business, a change in the premium rates on important plans, or a change in underwriting standards, and so forth, then the model office approach is the only one that can give meaningful answers. On the other hand, if you are asking questions about the profitability depending upon adherence to specific budget limitations, then the analysis of operation approach would seem quite adequate. In the analysis of operation approach, all the data are presented that should be necessary to determine after the fact why it is that the projection did not work out. This negative control or after-the-fact analysis is probably most important from a management point of view, in that it allows management to evaluate its performance with respect to predetermined goals and to establish a reason for failure to meet the goals or to look for the reasons that allowed the goals to be surpassed. The over-all approach does not seem to be usable for management-control functions but is perhaps suitable for the type of broad projection from the outside necessary for a security analyst.

In James Walter's *The Investment Process*, published by Harvard Business School, there is a discussion of cash-flow projections which make rather neat distinctions between the accounting tautologies and behavioral equations involved in a projection of any kind of operation. These

projections are done primarily from a cash flow point of view and include a sort of Monte Carlo approach toward the simulation of operations under various conditions. It would seem that adding on the possible variations in some of the parameters within limits, say, death claims, might have some advantages in predicting the possible necessity for additional financing for a small new company. This approach has not, to the best of my knowledge, been used. One technique which fits within the general area of analysis of operations, for the life insurance business, is included in the Reynolds Griffith book, *The Valuation of Life Insurance Stock*. Mr. Griffith bases his approach toward values of life insurance stock on discounting the projected profits of a block of life insurance business in force. His approach, therefore, does involve long-range projections of business, and he has developed some computer programs which he feels are adequate for that purpose. I know of no other literature appropriate to this subject and would be interested in hearing of any from any other members.

The last area that I would like to cover is the experience of Standard Security in the use of projections. This may be of interest, in that it covers a period from the inception of the company through \$400,000,000 in force. Our first attempt at projections used the conventional model office approach. This was nice because it gave us a feeling of some confidence, in that we were using a generally accepted method and could, from the model office, tie ourselves into projections of the entire operation. The amount of work involved was, of course, very substantial and would prevent our doing this type of projection very often. Unfortunately, for a new company, the problem is that, in our experience, it is just not possible to tell what kind of business you will be selling and in what volume. These things are, at best, educated guesses, and they cannot be expected to work out. For a new company, however, it seems to me that this is about the only approach one can take.

Determined that we should avoid doing that much work again, if at all possible, and imbued with the belief that the directors and management of the company should have a clear idea as to how insurance profits arise, we worked out factors which were intended to represent the strain on surplus on new issues and the profit on renewal business, which Mr. Gold refers to as the over-all approach. The approach is very attractive, in that it reduces everything to simplest terms. If the sales are so much, and the renewal business is so much at the beginning of the year, then the profits for the year fall out rather automatically. At that point, we even attempted to develop several different figures from this over-all approach, including the statutory profit on an over-all basis, the cash flow on an over-all basis, and the adjusted earnings on an over-all basis. These

factors were constructed from a model office approach and were helpful, in that it was very easy to explain the meaning of these items to management and to the directors, and it made them feel very knowledgeable about the life insurance business. Unfortunately, the use of these factors was misunderstood by everyone who had access to them, and, when projections based upon this approach seemed not to work out, there was nothing within the approach which would give any indication as to the reasons for failure. Our experience would be, then, that the over-all approach, while perhaps useful from the point of view of a security analyst since the first-year drain on surplus is related to the figure which analysts use for adjusting earnings, is relatively less useful in the planning and control functions which are the functions of management.

Since about 1961, we have been using a version of the analysis of operations approach. Projections are normally done in March or April for the next three years. The results have worked out reasonably well over this period of time and have worked out very well if we consider the function of projections to be primarily for management planning and control rather than an all-out attempt to probe the future. The analysis of operations approach does give an indication as to what the effect on surplus will be on a year-by-year basis and allows co-ordination of these results with the planned expenditures of the company. Further, if the results differ from those projected, there is enough breakdown to indicate the area in which the difference developed, so that the process of rectification of this area in the future can be intelligently undertaken.

DONALD B. WARREN:

In view of Mr. Gold's statement that very little has appeared in the actuarial literature about financial projections, I am delighted to note the close affinity between his paper and my paper entitled "Financial Projections for New Life Insurance Companies," which I delivered in 1964 before the Seventeenth International Congress of Actuaries in London.

In my paper I developed a rather detailed method of projection because (1) it seemed desirable that the individual items therein should attempt to tie in as closely as possible with similar items in forthcoming annual statements, (2) I wanted to illustrate the effect of starting a new company in the middle of a calendar year (which would be the usual situation), and (3) I wanted the rate of production to build up gradually during a given year rather than starting and continuing at the same high level. I also tried to demonstrate the effects, particularly in the first calendar year, of sales of fractional premium business.

For these reasons I first made complete separate calendar-year projec-

tions for representative plans, ages, and modes of payment and then synthesized those projections into the summary of operations. The use of computer techniques permits rather complicated and detailed calculations to be made for a relatively small expenditure of time and money. Mr. Gold, on the other hand, has developed one artificial plan of insurance which is supposed to represent satisfactorily variations in premiums, commissions, cash values, reserves, lapse rates, and size.

I think that the most vulnerable part of Mr. Gold's procedure is the use of annual premium projections throughout. In the first calendar year of a new company's operation, this assumption can produce substantial variations between projected and actual premium income and commissions. It can also overstate substantially the expected insurance in force at the first year-end, since it allows for no lapses. It can also have similar effects in subsequent years if production increases rapidly. Admittedly, projected versus actual operating losses (particularly in the first calendar year) will be little affected by mode-of-payment assumptions, since commissions, claims, and reserve increases will probably just about be equal to whatever premiums are collected and the operating loss will closely approximate the amount of general insurance expenses. Such expenses are pretty much determined before a company gets into production and are relatively independent of any but extreme variations in production. It is relatively easy to explain variations between projections and actual annual statement results to a group of entrepreneurs if those variations are proportional to production; but it is much more difficult to explain them if they are due to assuming annual premium collections when actual sales are perhaps 50 per cent fractional. The closer the projection is to actual results, the more faith the new company will have in actuarial techniques during those formative years when it most needs to be guided by those techniques.

I have a couple of specific comments. First, there is the handling of reinsurance in Table 2 of the Appendix. The calculation of the net amount at risk is based on cash values, whereas I think most reinsurance is still based on reserves. This, of course, is a minor matter. Second, since social security tax rates are trending ever higher, it would appear that commission rates (at least in the first year) should be adjusted upward to allow for the employer's social security contribution.

I think that the method of handling investment income in Table 9 is worth discussing. In line 3 (investment income from insurance operations), Mr. Gold charges interest on the accumulated losses from all previous years against the operations of each emerging year. This may well be good theory, but it seems to obscure each individual year's actual

operating results. I think that this might be difficult to explain to non-technical entrepreneurs. I would prefer to show the gain (or loss) from what I consider to be the true insurance operations each year in line 14 and then insert a separate line, 14a, for the investment deduction for interest on accumulated losses; this would, of course, change the entry in line 3.

(AUTHOR'S REVIEW OF DISCUSSION)

MELVIN L. GOLD:

I would like to thank Messrs. Flinn, Hazecorn, Moorhead, November, Stein, Vanderhoof, and Warren for their comments and contributions.

As pointed out, the sample projection was for illustrative purposes only. An expanded projection will take into account other parameters, particularly age distribution and mode of payment. As Mr. Warren and Mr. Flinn indicated, the use of modal premiums allows for a closer tie-in between the projection and the annual statement.

The suggestion that each plan be individually projected and then synthesized at the end has considerable merit. While it may result in some additional work, it allows for far greater flexibility. The actuary is then in a better position to show the effect of changes in the parameters.

With regard to Mr. Flinn's question, we have found that with time a decreasing proportion of a new company's business is reinsured. This occurs partly because the initial submission generally contains many large semicaptive cases; also retention limits tend to be raised as a company's in force grows and it gains confidence in its underwriting.

Mr. Vanderhoof's observations on the relationship among the three projection approaches were particularly incisive, as were his comments on the practical aspects of which approach to follow. I was disappointed that Messrs. November, Stein, and Vanderhoof were the only members to comment on the more complex problem of making projections for existing companies.

I am sorry that I was not aware of Mr. Warren's contribution to the Seventeenth International Congress. He is to be commended for his contribution to the actuarial literature. As his title suggests, however, it was concerned only with new companies.

I would like to take this opportunity to thank Messrs. Herbert L. DePrenger, Roland F. Dorman, Manuel Gelles, George B. Kyle, Irving Rosenthal, James B. Ross, and C. David Silletto for reviewing the paper prior to its submission. Their suggestions were most helpful.