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SOCIETY RESEARCH AFFECTING THE VALUATION ACTUARY

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Progress Reports by the Committee on Valuation and Related Problems and its four task forces on C-1, C-2, C-3 and Overall Risks:

1. C-3 risk from interest rate variations
2. C-1 risk from asset defaults and common stock variations
3. C-2 risk from all other causes
4. Combination of all risks, capacity utilized, statutory reserves, internal management planning and early warning
5. Implications for the valuation actuary

MR. DONALD CODY: I am Chairman of the SOA Committee on Valuation and Related Problems. My fellow panelists are: Irwin Vanderhoof, Chairman of the C-1 Risk Task Force (on asset defaults and stock market variations); I will try to fill in for Carl Ohman, Chairman of the C-3 Risk Task Force (on interest rate variations); Carl is unable to be with us today. Dan McCarthy is Chairman of the C-2,4 Risk Task Force (C-2: other pricing risks, like claim variations, and C-4: accounting, managerial, social and regulatory risks). Mike Mateja is Chairman of the Task Force on Combination of Risks, responsible for putting it all together and identifying its implications for valuation statutes, regulations, early warning tests and company planning.

Purpose

Our purpose today is to make you aware of what has happened so far and what will happen in the next couple of years in research, development and applications in the areas of risk, valuation and contingency surplus. The economic environment and the response of the insurance industry have changed radically, and the scope of the responsibilities of the valuation actuary must necessarily enlarge as a result. The job of the Committee and its Task Forces is first to understand the problems - and I think that we have made some progress; secondly, to see how the whole thing fits together - we have one layout with through-put, but it needs improving; thirdly, we need to generalize and simplify the processes for the education of SOA members - and the needs and pressures are so great that this step may have to be rushed; and, finally, we must help the Academy, at the urging of the NAIC, to provide guidance and principles for the Opinions of valuation actuaries as to the good sufficiency of statutory reserves, and probably, ultimately as to the reasonableness of the contingency reserve for capacity utilized by in-force business for C-1, C-2 and C-3 Risks; this is being looked into by the Academy Committee on Life Insurance Financial Reporting Principles, more particularly by a subcommittee chaired by Allan Affleck. The NAIC Technical Staff Actuarial Group of insurance department actuaries, their Standing Technical Advisory Committee (chairman Charles Greeley) and its Subcommittee on Surplus and Solvency (chairman Walter Rugland) also attach high priorities to this work. Thus, the urgency is great.

General

Now, for a brief review of the overall area. A first cut at this, representing the state of the art in 1982, may be found in my Discussion Note presented at the SOA Orlando Meeting: "Contingency Surplus Needed for C-1, C-2 and C-3 Risks (Capacity Utilized)" printed on pages 697-713 of RSA 8:2 (1982). The Note lists all the risks in the three categories, suggests techniques for quantifying them and then combines them to determine the portion of the statutory surplus (including MSVR) to be set aside as contingency surplus for capacity utilized by in-force business. The balance of surplus is called "vitality surplus" which is capital still available for change, growth, risk taking and other types of corporate vitality. There is discussion of applications within lines, by product, by subsidiary and for corporate planning.

The size of the contingency surplus needed for C-1, C-2 and C-3 Risks depends not only on the quantification and combination of risks knowledgeably but also on the judgment of the valuation actuary as to the level of the probability of loss of solidity and ultimately insolvency acceptable to management and regulators. If a very low probability of ruin is chosen, the company may have little vitality surplus as capital to use for change and growth. If a high probability of ruin is chosen, change, risk and growth may be undertaken to the extent that solidity is very likely to be threatened eventually and the company will be brought up short by management or regulators and forced into painful and radical reforms.

The structuring of statutory surplus (including MSVR) into contingency surplus for capacity utilized and vitality surplus is a fundamental basis for management decisions and actions. As I see it, the valuation actuary occupies the most significant position in management in assuring the clarity of this statutory surplus structure for measurement, control and monitoring.

What are proper statutory reserves? Let's discard immediately the idea that they are necessarily the minimum reserves allowed by the standard Valuation Law. The NAIC Technical Advisory Committee on Dynamic Interest and Related Matters (now the Standing Technical Advisory Committee) recommended the 1980 Standard Valuation Law only on the condition that, as soon as practicable, valuation actuaries should include in their Opinion as to the good sufficiency of reserves held a statement that they had reviewed the effects of the degree of mismatching of asset/liability cash flows under various adverse interests scenarios, among other tests.

Statutory reserves should be regarded as amounts which, together with future premiums and investment income, make good and sufficient provision for benefits, expenses, taxes and, in the case of participating insurance, policyholder dividends, assuming variations of risks from expected values on a range of economic and claim scenarios not extending into very low probability, even though plausible, scenarios. Implied here is that assets backing the reserves will produce a stream of cash flows reasonably consistent with the stream of liability cash flows inherent in these reserves.

Beyond reserves, contingency surplus for C-1, C-2, C-3 and C-4 Risks is needed against variations from expected experience over a range of economic and claim scenarios which are low probability, but plausible. The level of low probability chosen by the valuation actuary should be made known to, and be acceptable by, management.

These definitions of reserves and contingency surplus needed are central to the research of the Committee on Valuation and Related Problems and its four Task Forces. Our work extends over understanding of the risks, means of optimizing them, procedures for quantifying them, and implications on corporate planning and capital available for growth and change.

The C-3 Risk

C-3 Risk is concerned with the cash flows from an insurance company's insurance and investment operations and how the relative values of expected cash flows may change when interest rates change. C-3 Risk emerges as the costs of disintermediation and intermediation arising from changes in the new money interest rate environment. It arises from the degree of mismatching of asset cash flows and liability cash flows under varying interest rate environments. On upside interest movements, policy loans, surrenders and voluntary withdrawals increase, and premiums and considerations decrease. On downside interest movements, calls on securities, prepayments of mortgages, premiums and considerations increase, and policy loans, surrenders and voluntary withdrawals decrease. In variable high interest movements, all these forces operate to the detriment of the company. Also, the change in the shape of the yield curve is likely to be detrimental for reinvestment.

In our business, with so many voluntary privileges, notably voluntary withdrawal privileges at book value, it is impossible to immunize asset and liability cash flows. Such immunization is possible only in fully managed portfolio valued at market and without voluntary withdrawal rights, where by trading, it is possible to keep the Macaulay duration targeted on the investment horizon, i.e., by "rebalancing". If you are interested in the mathematics of immunization, you can find some of it in my Discussion Note in RSA 7:4 (1981) pp. 1378-1391 "Contingency Surplus Needed for (C-3) Risk of Change in Interest Environment".

As we observed in the recent upside high interest environment, the C-3 Risk can be catastrophic, especially in investment type contracts like GIC's and SPDA's. Methods of control are necessary: these include segmentation of the general account, coordination of investment policy and product policy, both needed to clarify degree of asset/liability matching, and well developed IYM procedures within segments to enable quantification of effects of potential disintermediation and intermediation along low probability, yet plausible, interest rate scenarios. If companies are too small to enable fully developed segmentation-IYM procedures, then workable surrogates are absolutely necessary.

The C-3 Risk Task Force, chaired by Carl Ohman, during 1981-1983 has brought out a large volume of impressive research on this risk. I have made a bibliography of the discussion notes and papers and copies are available and will appear as part of the Record in Appendix A.

The 1980 Standard Valuation Law was designed with some understanding of the C-3 risk; but we realized that, absent analysis of the degree of mismatch of asset/liability cash flows under varying scenarios, the minimum reserves allowed by the Standard Valuation Law could be inadequate. This is especially true for SPDA's, where voluntary withdrawals on a book value basis are a predominant feature.

The technique developed by the C-3 Risk Task Force involves the determination of the contingency reserve needed for C-3 Risk in excess of the reserve held, as the amount required to fund losses on the statutory basis emerging on the most adverse low probability interest rate scenario included in the universe of scenarios considered. IYM processes are used, allowing for both positive and negative net cash flow for investment, and assuming borrowing from new business cash flow, other lines or from surplus, i.e., not assuming sales of securities with attendant immediate capital loss in upside interest movement, but mathematically equivalent to such sales in the long run. Effects of calls and prepayments on assets and effects of withdrawals, surrenders and policy loans are introduced as functions of the interest scenarios and operational data. The modelling process is complex and to my mind is necessary in some equivalent form if the valuation actuary is to exercise his responsibility with confidence.

Some of the results on GIC's with voluntary withdrawal privileges on a book basis and with poor matching of asset/liability cash flows are shocking. Even more shocking results appear on SPDA's with long assets held against inherently very short liabilities.

A first step at requiring valuation actuaries to test the effects of degree of mismatch of asset/liability cash flow along a universe of interest rate scenarios has been taken by the New York Insurance Department with respect to reserves held on GIC's and other annuities. I suggest that response be made with the background and techniques of the C-3 Risk Task Force.

I have found a simplified formula for C-3 Risk costs, which is quite helpful in understanding the risk as essentially the inability of the generated IYM interest earnings to support required interest on reserves on non-par contracts (like GIC's, non-par life insurance and high interest rate guarantees on SPDA's) or interest needed in dividends or credits on par contracts to assure persistency (like SPDA's, universal life insurance and par life insurance). This formula is shown in Appendix B as part of these proceedings. Full discussion may be found in my Discussion Notes in RSA 7:4 (1981) pp. 1378-1391 and RSA 8:2 (1982) pp. 697-713.

The first term is the loss due to the deficiency of the IYM interest rate compared with the required interest on reserves. The IYM interest rate is affected by the historical net cash flow available for investment from premiums, investment income, asset maturities, prepayments and calls, withdrawals, surrenders, policy loans, etc., all functions of the interest rate environment.

The second term is the additional loss arising from dividend excess interest factors and excess interest credits. To the extent that these credits exceed those enabled by this real IYM earnings, the loss is exacerbated.

The third term is a credit of the surrender charges made on surrenders or withdrawals. If the withdrawals are on a market value basis, this becomes large enough in upside interest movements to prevent IYM interest rates, after credits from the market value based withdrawal values, from being reduced by payouts when new money rates have increased over yields on assets held; this is the reason why LPG contracts with market value adjustments on withdrawals have little C-3 Risk.

This formula is interesting not only for understanding of the C-3 Risk, but also as a reminder that the valuation actuary has always had responsibility under Academy Recommendation 7 for examination of the relationship of yields on assets relative to required interest on reserves, and this formula is an elaboration of the need for this consideration on upside and variable interest movements as well as on downside movements.

Unfortunately, this simplistic formula cannot be used to quantify the C-3 Risk, because the IYM interest rate must be cumulatively determined along scenarios with reflection of the dynamics of rollovers, calls, withdrawals, surrenders, policy loans, etc.

I believe that the C-3 Risk requires some fundamental changes in insurance company organization and approaches as a result of our movement into investment type products and the variable high interest economic environment anticipated in the foreseeable future. Eventually, these changes in approach will be accepted as necessary cost-benefit accommodations against the C-3 Risk, just as today medical underwriting and contract restrictions are accepted as necessary against C-2 Risk, and portfolio diversification and credit evaluation are accepted as necessary against C-1 Risk. Among the new approaches will be these:

1. Formal coordination of insurance operations (product design, underwriting, pricing) and investment operations (yields, maturities, reinvestment).
2. Assured capability for analyzing asset configurations by maturity distribution and IYM yields in segmented general accounts or notional surrogates, separate accounts, or specialty companies by type of product.
3. Assured capability for projecting security call functions and contract termination, withdrawal and borrowing functions along interest rate scenarios.

4. Clear responsibility of valuation actuaries for considering the impact on the effects of degree of mismatching of asset/liability cash flows on the good sufficiency of statutory reserves over a range of "normal" interest rate scenarios and the availability of contingency reserves over a range of more adverse, yet plausible scenarios.

These controls must be the next major development with respect to the C-3 Risk.

Appendix A

References

- (1) (a) General Theory: RSA 7:4 (1981) pp 1378-1391, D.D. Cody, "Contingency Surplus Needed for (C-3) Risk of Change in Interest Environment"
- (b) RSA 8:2 (1982) pp 697-713, D.D. Cody, "Contingency Surplus Needed for C-1, C-2 and C-3 Risks (Capacity Utilized)"
- (2) GIC Applications: RSA 7:4 (1981) pp 1368-1377 J. A. Tilley, "Preliminary C-3 Risk Calculation"
- (3) Non-Par Life Application: (a) RSA 8:1 (1982) pp 47-48, J.A. Geyer & M.E. Mateja, "C-3 Risk Calculations for Non-Par Life Insurance"
- (b) RSA 8:4 (1982) pp 1522-1541, J.A. Geyer & D.L. Arndt, "C-3 Risk for Non-Par Individual Life Insurance." Revision and extension of (a)
- (4) Par Life Application: RSA 8:4 (1982) pp 1542-1552, T.M. Owens, "C-3 Risk for Participating Whole Life"
- (5) Deferred Annuity Application: RSA 8:4 (1982) pp 1553-1561, J.E. Feldman & P.F. Kolkman, "Preliminary C-3 Risk Calculations for Individual Deferred Annuities"
- (6) Segmentation of General Account: TSA XXXIV (1983) Preprint September 2, 1983, J.A. Attwood & C.R. Ohman, "Segmentation of Insurance Company General Account"
- (7) Minimizing C-3 Risk: RSA 9:2 (1983) pp 558 - 564, M.E. Mateja, "Disintermediation, Investment Strategy and Product Design"

Appendix B

Loss in Year n From C-3 Risk
(Simplistic Formula)

$$\text{Loss} = -\Delta S_{n-1} = P_{n-1} \left[(V_{n-1} + P_n) (i_n - i_n^1) + (V_{n-1} + P_n) (i_n - i_n) - q_{n-1}^w (V_n - C_n) \right]$$

where n = duration along scenario from valuation date at n = 0

S_n = surplus S_{n-1} = 0, i.e., taken into company surplus at end of each year

-Δ S_{n-1} = Loss from C-3 Risk in year n

V_n = Reserve

P_n = Net premium

i_n = reserve interest rate

i_n = interest rate credited in policyholder dividend, in

excess interest credit on SPDA or Universal Life,

or on GIC

i_n¹ = IYM interest rate generated by the action of new money

rates and rollover rates on the (+ or -) asset

slabs, whose size and sign reflect the dynamics

of the asset/liability cash flows along the

interest rate scenario.

P_{n-1} = persistency factor

q_{n-1}^w = termination or withdrawal rate, excluding policy loans

C_n = surrender value

IRWIN T. VANDERHOOF: The C-1 Task Force started in operation in August of this year. The members are Faye Albert, Robert Espie, Ralph Verni, and myself. Mr. Verni is not a member of this Society. He is the chief investment officer of New England Life and has an excellent background in quantitative methods. The aim of the task force is to present a preliminary report in the Spring of next year, with a final report of the work that this group can do by the annual meeting next year. This discussion today should only, then, be considered the most preliminary thinking on the subject, and comments and suggestions from the members of the Society here in attendance would be helpful in that they can add to the preliminary ideas already developed.

It seems to me that there are two different levels of problems that the task force must work on. The first group are what I think of as the technical problems, and the second the conceptual problems. The distinction that I am making is that some of the problems can in theory be solved providing enough time and research effort are spent. The second kind of problems are those where even the question is not clear and certainty about eventual solution of the problem depends more on some new understanding of the question than on simply spending additional time consulting the appropriate journals.

I will start off this report with a short discussion of the technical problems. First is the question of the experience to be used. Consideration was given to some kind of massive study of security defaults over the past several decades. This would have been an updating of the Hickman study of security defaults covering about the first half of this century. The revised data of this study were the basis for the book by Fraine upon which the original MSVR was based. The task force generally agreed that this was not a first order of priority because little could be gained by additional information of this sort. The reason is that if we are talking about an amount of segregated surplus that is adequate to protect a company against a rare turn of unfavorable economic influence, then we have already the data on such a period. The depression of the thirties was it for our lifetimes. Therefore, if the objective is to provide a standard for the C-1 risk that would allow a company to remain viable during another similar period, we already have the data. The only real information that studies of more recent periods can provide is that catastrophes of the magnitude of the thirties do not occur often. We already know that. We are, therefore, simply working on the basis that the experience of the thirties actually represents the worst kind of economic disaster that we should be concerned with.

There is a related conceptual problem that we have not addressed and are likely not to successfully address at any future date. This is the question of whether there has been such a fundamental change in the nature of the economy that nothing like the thirties could ever reoccur. If the results of the task force work ever reaches the level of the regulator, the regulators may wish to consider that difficult problem.

Since we have already chosen the period of risk for default and determined that we do not need more modern data, why isn't this part of the problem already solved? There are, unfortunately, a variety of

pieces of information that are not covered. In the first place, Hickman and Fraine studies concerned themselves only with securities. Therefore, while we have information on common stocks and bonds we have are no information on mortgages and real estate. Mortgages have generally had about the same importance to companies as bonds and real estate for some companies, more important than stocks. Roughly, then, all of the information that we have covered only about half the portfolio of investments. There is, then, a substantial technical job in deciding how to treat the remaining half of our investments.

This job is considerably worse than it sounds, and some of the problems relate back to securities. For the securities case, consider the question of default risk of a direct placement of the preferred stock of a parent into the investment portfolio of a subsidiary life insurance company. This is, of course, the Baldwin-United situation. Personally, I do not see anything inherently wrong with such an investment. However, I do think that this has to be considered a special class of investment for an insurance company, and there should be some special criteria for the C-1 risk in such an investment. None of us right now knows what to do with this problem. However, I still believe that we can reach some reasonable conclusion.

Think about real estate. Let me compress most of the problem into one example. An insurance company enters into a joint venture with a developer wherein they each own half the equity and the insurance company provides the joint venture with a mortgage, at below market rate interest, for the cash needs of the venture. The insurance company then has some equity ownership and a mortgage. If the venture is unsuccessful, the mortgage goes into default and the entire holding becomes equity real estate on the company's books. However, the company could later sell the property for a considerably higher price using a purchase money mortgage with an interest rate far below current market and then the entire holding would become a mortgage. While this entire story may not be common, the regular transfer of interest in a property from mortgage to equity and back again is. With the possibility of below-market interest rates and inflated sales prices, it would be difficult to determine if a loss actually took place, equity or mortgages, and if so when. This is still in the area of technical problems and should be subject to some definite solution. I think that in this case the task force may be required to make some heroic assumptions to reach the solution.

Another problem, of course, is a determination of the kind of default formulation that should be developed. One possibility is that the amount of the possible maximum loss should simply be related to the appropriate asset. This was the pattern used in the various publications by Bob Link on the Equitable Risk Analysis Model. There is another approach which is probably superior. That would be to relate the possible losses to each future year the asset remains in existence. Though more complex, this is probably more appropriate for the eventual combination of the C-1 work into the final combined risk model.

Now that I have described all of the easy problems, I will start describing the conceptual problems that we have recognized so far. The first, of course, is: What are we talking about anyway? We have generally agreed that we should be trying to come up with something that is similar in nature to the MSVR, but which includes all assets and is an allocation or segmentation of surplus rather than a liability. But what is the surplus of a company? Generally, we think of it as the statutory or perhaps the GAAP surplus defined in accordance with the various accounting conventions and regulatory requirements. But there are many reasons for doubting the appropriateness of this number for the use of the C-1 task forces.

Let me give one example: A midwestern company has a statutory surplus of about \$200 million. It is carrying on its books Florida real estate for a cost of about \$30 million. The market value of the real estate is about \$1 billion. That last amount does not show up in the convention blank. What, then, is the surplus that should be adjusted for the C-1 risk? Or consider the far more common reverse situation where we are dealing with bonds that now have a market value well below cost. The most commonly used reserving methods create reserves which are a reasonable approximation of the cash values of policies, and they can be argued to represent a deposit liability -- the policyholder has a right to withdraw whenever he chooses. In this more common case, the statutory surplus of the company again does not represent a dependable measure of the strength of the company in the event that policyowners decide to surrender.

This has seemed to me to be a key conceptual problem. If the assets should be considered on a market value basis, which is what they would be in liquidation, and the policyholder cash values should be considered to be deposit obligations, then the true surplus of most companies would be negative. I am not particularly interested in making a big issue of that point, but if this is true, then there seems little need to worry about a segregation of the positive value of this surplus.

A stock-oriented member of the task force pointed out to me that this problem had already been passed in GAAP accounting. Under GAAP accounting, the expected values of the future cash flows are considered, and the deposit liability problem is replaced by the problem of realistically evaluating the probability of surrender and the time when it may occur. She then spoiled the whole thing by mentioning that GAAP surplus is still calculated according to the many accounting conventions, and it is probably, therefore, no better as a base from which to work for the amount of the C-1 surplus. While many non-balance sheet items that should be included in the surplus of a company were in the GAAP surplus, many of the other kinds of adjustments mentioned above were not.

During the preparation of the material for this program, it occurred to me that there might still be a straightforward solution to the problem of what kind of surplus we should be working with. The following suggestion has not been discussed with the task force. There is another calculation that avoids the valuation problem of assets and also considers the probability of surrenders rather than accepting them as a deposit liability. That is, the work of the C-3 Task Force.

In the C-3 work, all of the future cash flows are considered under a variety of scenarios about the future of the economy. In doing so, the calculation not only adjusts for the mismatch of assets and liability maturities, but at the same time, also replaces the assets by present values of the future cash flows and the liabilities by the present values of their cash flow streams. An implicit adjustment is then being made to bring the statutory surplus to a realistic basis.

If this view is accepted, then there is not a problem in considering an amount of segregated C-1 surplus so long as the C-3 segregation has taken place. This confirms the long held view by Don that the risks must be considered together.

A remaining conceptual problem resides in the actual development of the work of the C-3 Task Force. Equities are not included. While it can certainly be argued that the appropriate position of an insurance company should be that of working on the spreads available in the markets and not being particularly interested in equities, the fact remains that equities over the long term produce higher yields than debt, and the failure to include equity among our investments will result in lower overall yields. Whatever the position that is accepted on this issue, it is clear that many companies have equities in their portfolios, and not including any mechanism for bringing them into the C-3 work means it is incomplete. Further, to the extent we accept the argument that it is crucial that the C-3 work be done to establish the surplus on which the C-1 risk operates, the C-1 risk cannot be defined until the C-3 calculation includes equities. Similar arguments apply for the inclusions of other kinds of financial instruments into the C-3 calculation, particularly those which might be inflation-adaptive.

Overall-the task force has started attacking the key conceptual problems, but much remains to be done.

DANIEL J. MC CARTHY: First, C-2 risk is defined to be the risk of loss from "insurance risks" - mortality, morbidity, etc. (The C-4 risk, so-called, is the risk of loss from miscellaneous sources, which can include natural disasters, social changes, unintended errors, etc.; I would contend that the potentially more massive of these are principally the function of surplus - and reinsurance - than of reserves per se).

Second, I will for the moment speak of the C-2 risk in isolation from other risks; Mike Mateja will be discussing the combination of risks, and you should not interpret any comments of mine to be in opposition to that which he will say about the "combination" problem.

Third, we begin from an environment in which, for the most part (at least the U.S.), there are statutory minimum standards for the development of reserves; the mind-set of the valuation actuary, in such an instance, is probably to determine first the statutory minimum and then set out to see if it is "good and sufficient" in light of the risks at hand. In some cases, however, there is no articulated minimum - claim reserves are typically an example of this situation - and in that case, the typical procedure is to "invent" an approach to developing what might be called a "normal" reserve, and then examine that reserve (as though it were a statutory minimum) in light of the perceived risks.

There has, incidentally, been a lot of general talk about the "1990 valuation law" - a hypothetical environment of the future which may not articulate fixed minimum standards at all. However, we are not there yet, and if we do get there, we will have to know a good deal more than we know in order to operate effectively, so current work will doubtless lean heavily on the notion of a statutory minimum against which to do our testing.

I think of the C-2 risks - the risk that the mortality, or morbidity, or whatever, may be worse than the statutory assumption (or, in the absence of such, the pricing assumption) - as having three different aspects.

The first, which I call fluctuation, refers to the situation in which mortality (or whatever) is expected to be within the standard over the long run, but there is the possibility of fluctuations which over some period of time may cause it to be poorer than the standard.

The second, which I call future degeneration, is the risk that mortality (or whatever), although currently running at a level which is within the standard, may possibly degenerate in the future (reversible term products pose this risk, to one degree or another, but they are not the only ones that do).

The third, which I will call current inadequacy, is the situation in which current experience is poorer than the standard.

Each of these has two cases with which to deal - the one in which premiums can be changed (or the contract terms otherwise altered) in the future, and the one in which no such alteration is possible. (In fact, the first of these has many sub-possibilities, depending on the degree to which alteration is possible, but that requires some further analysis in order to have fruitful discussion).

A lot of theoretical work has been done with regard to some of these issues, particularly the fluctuation risk. Unlike the C-3 area, where the development of the theory is quite new, the principal issue in the C-2 area seems to me to be one of consciousness-raising in the application of what is already known to situations which are in certain respects different from those confronted in the past, because of:

- a. Product differences.
- b. Differences in the economy.
- c. Differences in perceived professional obligation.
- d. Differences in requirements placed on us - or on the insurance industry - by outside forces - legislators, regulators, and "the public".

Therefore, the function of the C-2 Task Force, which is now being formed, is principally to assemble the results of work that has already been done (albeit not always with the same objective in mind) and refine it so that:

1. It speaks to the issue of reserve adequacy in relation to C-2 risks, and
- 2 Does so in a way which facilitates combination with other risks. The Committee is generally of the view that this is best done by expressing each risk in terms of potential variation in future cash flows. Mike Mateja will discuss this subject in more detail.

MICHAEL E. MATEJA: If you can recall from Mr. Cody's introductory remarks, he indicated that the Combination of Risks Task Force was responsible for somehow pulling it all together. Having listened to the previous reports, I must confess to a sense of awe and uneasiness about our charge. Is it possible that this diverse collection of ideas can be pulled together so that they make sense? At this point, I can only say, I hope so! Otherwise we are destined to failure, and from what I understand of the need, we, and by this I mean the Society as a whole, cannot afford to fail.

The idea of need, it seems to me, represents a good place to start. Mr. Cody indicated a sense of urgency in his introduction, but did not provide any further explanation. One may reasonably ask, why pull it together? Why hasn't it been pulled together before? And why is it so important now compared to, say, ten years ago or 100 years ago? I have some thoughts on this which may help to put the work of our Task Force into perspective.

To begin with, we must establish that the insurance business is a risk-taking business, and that an insurance company is conceptually a risk manager. The insurance and investment risks assumed by an insurance company are the C-1, C-2, and C-3 risks of which you have just heard. C-1 and C-2 risks have long been recognized by the industry, and we have developed effective means to control them. Surprisingly, the C-3 risk has only recently been widely recognized, as the industry has tried to cope with the unprecedented volatility in the financial markets. It remains to be seen whether the industry can develop means to control the C-3 risk that are as effective as those used to control C-1 and C-2 risks.

An insurance company, of course, is also a business enterprise, comparable to any other business enterprise. As such, it is exposed to the same kind of business risks which threaten other business enterprises. Such risks have been christened C-4 risks, and include regulatory, social, technological and competitive changes that threaten a company. From the remarks of our keynote speaker, Dr. Martel, it seems clear that the future holds promise of an abundance of such change. Little formal work has been done to quantify these risks, but it is my personal judgment that they are quite material. I will have more to say on this subject later.

Now, I will state as an axiom that it takes surplus to manage risk. When risk manifests itself, there is a need for the insurance enterprise to come up with cash to make good on its contractual obligations. Current income will not always be sufficient. Hurricane Alicia provides the most recent example of the consequences of risk taking within the insurance industry. Suddenly, the casualty companies were faced with claims close to 1 billion dollars. For many companies these claims

could only be met by drawing on surplus. Within the history of the life insurance industry, the 1918 epidemic, the depression of the 1930's, and the disintermediation associated with the upward spike of interest rates in 1979/80 have produced the most severe demands on surplus.

Now, there is an intuitive relationship between risk and surplus - the greater the risk, the greater the surplus required to manage the risk. It follows that with unlimited surplus it is possible to manage any risk. Few insurers are blessed with the luxury of unlimited surplus so that there must be concern about the level of the risk assumed. It has been my perception that our risks have been increasing while surplus available to manage those risks has been decreasing. A little research and reflection have confirmed this perception.

Several years ago, we made an extensive study of the historical surplus levels of our life companies. It was quite revealing! In the 1920-1930 period, the surplus to liability ratio of our companies was in the upper reaches of the 10-15% range. During the depression years, it slipped to under 6%, and did not again reach 10% until 1944. From 1945 through 1968, the ratio remained over 10%, reaching a high of 16% in 1961. The ratio steadily declined from that point and currently stands in the 5% range.

This overhead (Slide I) shows the relationship between surplus and liabilities for the entire life insurance industry from the turn of the century. There is more stability in the industry data than with our own results, but there is a consistent trend. Note in particular the unmistakable downward trend throughout the period.

The recent trend to lower surplus levels reflects the increasing emphasis on maximizing the returns on capital. In practical terms, this means that each dollar of surplus must support more business than in the past. Clearly, there is some compromise of solidity in this trend, but such seems to be the reality of the competitive financial marketplace within which we all operate.

What can be said of the level of risk assumed by the industry since the turn of the century? Acknowledging at the start that this is a very subjective and subtle area, two things stand out in my mind. First, there has been a substantial broadening of risk which has been created by expansion into new markets and coverages. In the early part of the century, the business was largely concentrated in individual permanent life insurance. Today, individual permanent life insurance is still important, but its stepchild, group insurance, is now a dominant part of our business.

The range of new coverage offerings during this period in both individual and group markets has been literally overwhelming! There is now every imaginable form of life, health, disability, accident, pension and financial accumulation product available. New products truly seem as common and plentiful as ants at a picnic in the country. In recent years, as the financial markets displayed greater volatility, the rate of new coverage offerings increased as companies competed for their share of the dollars in the financial marketplace. New competitors were

on the scene as the traditional market lines between companies in the financial services business started breaking down. Clearly in this environment, the life insurance industry has been taking on many new and different kinds of risks, many of which I personally believe were not well understood. This thought was echoed in Panel Discussion 3 where Randy Adams observed that one of the implications of the "new freedoms" associated with the financial marketplace was unfamiliar risk.

The other thing that stands out with regard to the level of risk assumed by our industry is that there has been a decided movement towards more financial risk. Surely, there has always been financial risk associated with the insurance business, but in recent years much of our liability growth has been attributable to group GIC contracts and individual single premium deferred annuity contracts. These are primarily financial contracts, and the work of the C-3 Task Force clearly indicates that there is substantially greater risk with these contracts than with traditional individual permanent life insurance. Indeed, C-3 risk potential for these and similar products overwhelms the traditional levels of C-1 and C-2 risk that have been assumed by the industry.

One is left to wonder, therefore, about the relationship between risk assumed and surplus levels. If the industry was financially strong in prior years, are we as strong today? Certainly on the basis of a crude relationship between surplus and liabilities, the answer is no. When the likelihood of substantially increased levels of financial risk is factored in, one is left with the uncomfortable feeling that the industry may be taking on more risk than it can successfully manage. Many regulators share this concern, and I know of at least one corporate actuary that is very concerned. The increased number of insolvencies, including at least one large company specializing in SPDA, has only served to confirm previous perceptions in this regard.

Here, then, is the reason we need to pull it together. In simplest terms, we need to understand more about the risks we are assuming in our own selfish best interest. If we assume more risk, we need to be ready to hold more surplus to manage that risk. If we do not, we may unwittingly be planting the seeds of our own destruction. Destruction in this context does not necessarily require widespread insolvency. It would only take a few more headlines of the sort we have seen recently to undermine the public confidence in our industry. Our business is built on trust, and without it we cannot prosper.

I hope you will agree that there is indeed a need to pull it together. Our task force is committed to this goal. Hopefully, we will somehow do so on a basis that makes sense. In the end, we hope that you, your management, the regulators, and your policyholders will have somewhat greater confidence in your financial strength and your ability to mature your obligations in both good times and bad times.

Mr. Cody also mentioned in his opening remarks that each Chairman would report on what has been accomplished and what work will be undertaken in the future by his Task Force.

Most of the work of the Combination of Risks Task Force must be spoken of in the future tense because we have not done too much to date. Much of our work, of course, depends on the other Task Forces, two of which are just getting started. In the time remaining, I want to share with you some of the thinking I have done about the problem of combination of risks which is largely drawn from the work we have done on this subject within my own company and which will certainly affect the future work of the Task Force.

Let's begin with a simple statement of our problem. What amount of surplus will assure survival of an insurance enterprise? Looks simple enough! Students of risk theory will recognize the makings of a classic ruin problem. So, the order of the day should be to brush up on risk theory and charge ahead. This, no doubt, will be part of our work, but I see many practical problems that do not lend themselves to neat theoretical solutions.

Let me first state that I do not think there is a unique answer to the question, and I don't expect this Task Force to develop a series of formulas that will magically produce appropriate surplus levels for an insurance company. Establishing surplus levels has been and will always be a management function. What we should be able to accomplish is to provide some basis for making a judgment about the reasonableness of surplus held in the light of risks assumed. Achieving even this modest goal will require that many practical problems be overcome.

The first practical problem is an appropriate definition of ruin. In the C-3 work, ruin was defined in terms of statutory surplus. GAAP principles have formalized the concept of an investment of surplus in the inforce business. Our analysis suggests that for individual life insurance business this investment could represent an amount well in excess of the surplus traditionally held in the balance sheet. Should such "hidden" surplus be recognized in the formulation of appropriate surplus levels? Considering the competitive pressures on surplus levels, it may be essential to do so. In theory, at least, such surplus could be tapped through reinsurance transactions in a time of need. Sounds plausible, but we need to consider whether it is likely that a reinsurer with the necessary cash could be found in a time of need.

This line of thinking raises the question about the appropriateness of our present method of statutory accounting and the fact that it does not fairly present the "economic" strength of a company. Mr. Vanderhoof alluded to this in his comments about the difference between the statement value and market value of real estate. There is also a problem in dealing with asset and liability mismatch. As Mr. Cody has mentioned, there is a committee within the Academy addressing this issue, and their findings could ultimately have a material bearing on the work of our Task Force. At any rate, we need to be sensitive to the problem of defining ruin and how our findings may be affected by different definitions.

No matter how ruin is defined, we will be concerned with the distribution of gain (and loss) for an insurance company, and the next practical problem is developing such a distribution. Conceptually, if we could develop a frequency distribution of loss with respect to each

risk assumed by an insurance company, it may be possible to develop a frequency distribution of the losses from all risks. Assume this is the resultant combined frequency distribution (Slide II). Please do not attribute any significance to the curve - it is purely arbitrary. We are concerned with the portion of the curve to the left of the vertical axis. Both the amount and likelihood of loss are of concern. The vertical lines to the left are intended to represent the loss potential with respect to identified catastrophic risks which have low probability of occurrence, but very large loss potential.

Please note that if this distribution represents the results for, say, one year, then there would be similar distributions for the combined results for two years, for three years, and so on. While the distributions for the combined results of successive combinations of years would change, indicating changed loss potential, there would be no change in the loss potential for the catastrophic risk.

The presence of catastrophic risk has dominated my recent thinking on surplus levels. Our analysis indicates that the level of catastrophic risk overshadows the risk associated with the predictable random variations in financial results that may be observed from an analysis of actual gain experience. I believe it is significant that the major threats to the solvency of the life insurance industry in this century all have catastrophic overtones, e.g., the 1918 epidemic, the depression of the 30's, and the disintermediation of 1979/80 caused by the upward spike of interest rates. This raises some doubts in my mind as to the usefulness of analyzing actual gains experience. Perhaps we need only concentrate on catastrophic variations in experience associated with specific risks? If so, we are faced with a new array of problems. How do you quantify a future catastrophe? How many catastrophes do you look at and how do you combine surplus required for individual catastrophes?

Another practical problem is how to use any methodology, whether it be based on catastrophic losses or otherwise, at an individual company level. While Aetna's methodology may be adaptable for another company, I doubt that our specific results would be relevant for another company. This, in part, is due to the fact that Aetna's results reflect unique Aetna policy and practice with regard to such variables as markets, coverages, product lines, underwriting, pricing, investment mix and quality, and so on. In short, these variables lead me to have reservations about our ability to produce a simple formula that will somehow combine risks for all companies. I believe that surplus determination will prove to be a highly company-specific task reflecting the specific risk-taking profile of each company.

Another practical problem has come sharply into focus as a result of our work on the C-3 risk. When we were focusing solely on C-1 and C-2 risks, we developed satisfactory results by using traditional statistical theory to combine risks. Our approach was consistent with the approach outlined by Mr. Cody in his material presented at the Orlando meeting. In the analysis of C-3 risk, we basically followed a deterministic model approach, and it is not clear how such results can

be combined with C-1 and C-2 results, except by incorporating these additional risks within the C-3 model. Moreover, our analysis of C-1 and C-2 risks has implicitly assumed that a dollar of surplus was equivalent to a dollar of cash. Our work on the C-3 risk has clearly revealed that this assumption is not valid.

We have completed an analysis to illustrate how the C-3 risk complicates the problem of combining risks. Our approach was to analyze the risks associated with one individual life policy, and find the surplus level required to assure solvency from a specified level of risk.

We restricted the analysis to two specific risks. C-2 risk was generated by assuming increased levels of mortality for a specified period. C-3 risk was generated by assuming an increasing interest rate trend with associated higher lapses.

First, here is the surplus developed for each risk separately. (Slide III). Also shown is the result of combining the surplus required using traditional statistical techniques. If the risks are 100% correlated, an unlikely situation for C-2 and C-3 risks, then the surplus required to manage the combined risk is the sum of the surplus required to manage the separate risks, or \$1210. If the risks are not correlated at all, then the required surplus is \$940 developed from the formula at the bottom of the slide.

The following slide (Slide IV) additionally shows the surplus developed within the model when both risks occurred simultaneously, which effectively means 100% correlation. Note that the surplus of \$1323 developed within the model implies a correlation greater than 100%. How can that be?

To those of us who have worked on the C-3 risk, the answer is obvious and reflects the simple fact that a dollar of surplus is not necessarily equal to the dollar of cash. In the level interest scenario used to develop surplus required for the mortality risk, \$329 of surplus was the amount required to cover the additional claims (actually, the present value of the additional claims) that had to be paid in cash. In the increasing interest scenario, it effectively requires something like \$442 of current book surplus to generate the same level of cash to cover the extra mortality.*

If these risks are truly independent, then it should be obvious that there are severe practical problems in appropriately combining the risks in a model environment.

*This statement isn't exactly true because the interaction of C-2 and C-3 risk produces a somewhat lower level of extra mortality because of the effect of increased lapse. The concept at any rate is certainly valid.

We have observed similar results in other applications which have made me suspicious of traditional statistical combinatorial techniques. In our own work within the Aetna we are relying more and more upon a model analysis where we simply specify the worst interest rate trend and cash outflow we want to survive. We expect this approach to simplify discussions with our management, primarily because of the ability to clearly illustrate the effect on surplus requirements of changes in the underlying assumptions.

No doubt, this problem will receive considerable attention from the Task Force. I expect that this will be only one of many practical problems that we will encounter.

Finally, I want to speak briefly about C-4 risks, vitality surplus, and the effects of market constraints on the surplus that can realistically be held by an insurance company.

Should a surplus methodology anticipate the risk that FIT expense doubles or even triples? Should it reflect the risk that our liabilities could increase because a law is passed that prohibits "discrimination" between the sexes? Should it recognize the risk that government may take over our markets or change regulations or taxes so that markets are effectively destroyed or opened to new competitors? Should it recognize the risk of a shutdown of computer operations because of a massive power failure? Should the surplus requirements reflect a changing public attitude towards permanent and term insurance? Should they reflect the potential for a complete loss of public confidence in financial institutions? These are some of the real business risks faced by all insurers in today's world. Nobody could have even anticipated some of these risks as little as five or ten years ago. No doubt, the future holds promise of risks currently undefined or unimagined which insurers will face.

Surely, we must be prepared to survive risks associated with changes in the real business environment within which we operate. These are the so-called C-4 risks, and I am personally convinced that they may in the final analysis have more impact on surplus requirements than the insurance and investment risks unique to an insurance company.

C-4 risks conceptually would include the risk of management error or mistake which, from my personal observations, seems to be the risk that most of us will most frequently witness within our companies. I have seen some financially painful decisions made within our company, and I suspect our situation is not unique.

How are such business risks to be identified and quantified? How can they be combined? How can these business risks, in turn, be combined with the insurance and investment risks assumed by an insurance company? As you can see, I am long on questions, and at the moment somewhat short on the answers. These questions, at any rate, are the underlying reason why I believe there is no unique answer to the question of what amount of surplus will assure survival of an insurance enterprise.

In Mr. Cody's work on surplus requirements, he coined the expression "vitality surplus" to mean the difference between surplus held and surplus utilized to manage the risks on the inforce business. Vitality surplus provides a basis to grow and for management to take an opportunistic attitude toward investment and product development. In our own work we coined the expression "management flexibility component" of surplus to conceptually represent the equivalent of vitality surplus. Clearly, management has more flexibility as the difference between surplus held and surplus utilized increases. This suggests that management would strive to hold as much surplus as possible so that they would have as much flexibility as possible.

This is where the theory and practice depart, since at a practical level I am convinced that there is a real limit on the amount of surplus that can be held. This limit is effectively established by the marketplace which places constraints on the profits derived from our business. Profits represent the return on our surplus, and in the end we must be prepared to produce a reasonable return in order to attract and retain the capital we need to support our business. If, for example, the marketplace limits profits (including earnings on surplus) in a stock company to, say, 1% of liabilities, then if investors are seeking a 15% return, it would effectively limit surplus (both reported and "hidden" surplus) to about 6.7% of liabilities. This limit would apply no matter what our analysis of risk suggests in an appropriate surplus level. For mutual companies, I believe similar constraints will apply.

This line of thinking suggests that the most useful result of our work may be better understanding of the risks assumed so that the surplus required to manage those risks, i.e., capacity utilized, will be well within the range of surplus levels established by market constraints. This would assure that there will always be enough vitality surplus or management flexibility to sustain our business. It could even serve to protect against the risk that the Combination of Risks Task Force, or some successor group, somehow got the wrong answer as to capacity utilized.

I trust these comments have provided some useful insight about the future work of the Combination of Risks Task Force. It is clear that we are sailing through largely uncharted waters, and I have no illusions that our work will reveal all the perils that navigators of these waters should know. But I am hopeful that we can begin to shed some light on this subject that is responsive to the underlying need.

DANIEL J. MC CARTHY: To offer some perspective on our current attitudes for dealing with these problems, consider that you are an actuary obliged to set "good and sufficient" reserves, confronted with each of the following situations:

1. A company sells a mass-marketed insurance product with limited evidence of insurability. Mortality is anticipated to be higher than the valuation standard for several years, and has been higher so far, but ultimately lower. Premiums have been developed based on this assumed pattern of mortality.

2. A company is in the business of selling group A & H coverages to small groups. As of the valuation date, claims plus ongoing expenses exceed 100% of premiums. You have the right to change premiums six months hence, on average. You expect that if premiums are raised sufficiently at that point to overcome the ongoing deficiency, there will be high lapses, and the possibility that the antiselection inherent therein will make the experience even poorer.
3. A company sells annually renewable term insurance and has been experiencing high lapses. You consider it likely that future mortality experience will be poorer than the valuation standard.
4. A company issues deferred annuities. Because interest rates have been falling, you anticipate that, as interest declaration dates come up in the year ahead, it will be necessary to reduce credited interest rates prospectively in order to maintain breakeven spreads between rates earned and rates credited. However, you consider it likely that, to avoid an outflow of cash, management may elect to keep rates where they are or, at least, not to reduce them to breakeven levels.
5. A company issues structured settlement annuities on substandard lives. You have been using the pricing mortality basis as the basis for reserving. There are indications that mortality experience which is emerging may not be as substandard as had been anticipated in the pricing.
6. A company has high expense rates brought on by its small size. Assuming that these rates continue, it is clear that the present value of claims and expenses exceeds the sum of current statutory reserves and the present value of future premiums, not because of adverse claims or lapses, but because of expenses.

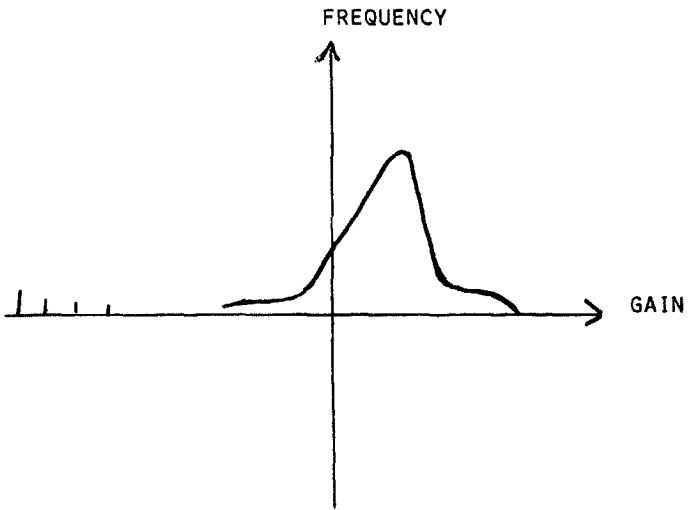
In the six cases I have enunciated, it is, more often than not, impossible for the valuation actuary to operate in a vacuum. He needs to be aware of the original pricing assumptions, the potential for management actions of varying types where policy provisions permit (or even where they do not, because "offers" can be made even in such situations) and, in general, to be in touch with the balance of the company. At the same time, this contact and the information he receives must not blind him to the requirement to exercise his best judgment as to what is "good and sufficient."

HISTORICAL INDUSTRY
SURPLUS TO LIABILITY RATIO

<u>YEAR</u>	<u>S/L %</u>
1900	16.7
1905	14.1
1910	14.5
1915	11.7
1920	8.4
1925	8.6
1930	7.7
1935	6.4
1940	6.3
1945	7.8
1950	7.8
1955	8.4
1960	8.8
1965	9.5
1970	9.1
1975	7.7
1980	7.7

NOTE: SURPLUS DOES NOT INCLUDE MSVR WHICH TENDS TO
UNDERSTATE RATIOS FOR PERIOD AFTER 1930

ASSUMED FREQUENCY DISTRIBUTION
OF
LIFE INSURANCE COMPANY GAIN/LOSS



COMBINATION OF RISK ILLUSTRATION

REQUIRED SURPLUS TO MANAGE RISK		STATISTICAL COMBINATION OF
C-2 <u>ALONE</u>	C-3 <u>ALONE</u>	C-2 AND C-3
\$529	\$881	\$1210 - 100% CORRELATION
		\$ 940 - 0% CORRELATION

$$940 = \left[(329)^2 + (881)^2 \right]^{\frac{1}{2}}$$

COMBINATION OF RISK ILLUSTRATION

REQUIRED SURPLUS TO MANAGE RISK		STATISTICAL COMBINATION OF C-2 AND C-3	MODEL COMBINATION OF C-2 AND C-3
C-2 ALONE	\$529		
C-3 ALONE	\$881		
		\$1210 (100%)	\$1323
		\$ 940 (0%)	

MR. GARY CORBETT: Irwin, you were talking about the need to come up with some probability distribution on C-1 loss. Has the group been doing anything with the correlation between the C-1 and C-3 loss; that is, do interest rate movements affect default patterns?

MR. VANDERHOOF: No, we have not. We know that the possibility exists. If we can develop adequate data on the other kinds of assets, then that would be a first step. If we are actually able to come up with something there, then maybe we will try the second step. I understand that it should be done but the condition of data is so bad that I am not terribly optimistic.

MR. CORBETT: There is little in history to show high interest rates at a time of depression.

MR. VANDERHOOF: Yes, in the great depression of the thirties, interest rates had a peculiar pattern. Very safe investments like government bonds were actually below 3%. For a few days in 1939, the yield on treasury bills was negative because of their security value. Risky investments in that environment had very high yields, but recently the situation almost reversed where very high interest rates created problems for certain kinds of companies. I think probably the best we are going to do is to speculate on the kinds of problems that would develop because they did not quite get there in the last round.

MR. CORBETT: Second question, on the C-4 risk, which is the unknown, things that we have not taken into account. Is this really an actuarial risk, is it really a reserving risk? It seems to me the type of problem that all businesses have. We may be a little worse in some ways, but every business has a problem of a change in government action, a change in demand and so on. It seems to me that is the type of thing that general surplus must try to cover and to try to ever quantify that risk is really problematical.

MR. MC CARTHY: I happen to agree with you, I think that is a question not so much of good and sufficient reserves but a surplus question. That does not necessarily then say that if it is or is not an actuarial question, but I tend to separate what has been called as low-probability plausible events or events that are subject to societal control and are outside the industry's control as a surplus and future management issue, and not as a reserve issue. That is just my own personal view.

MR. MATEJA: Yes, I would agree that to spend our time trying to quantify things of the sort that I have enumerated would be a hopeless task. The reason I point them out is that these are all big ticket items, potentially, in my mind, and if they should occur at a time when we are otherwise experiencing a maximum C-1, C-2 or C-3-type deviation, there better be some surplus available to manage that risk. I do not want everybody to concentrate on the things actuarial and ignore this other thing and assume that as long as we provide for C-1, C-2 or C-3 everything will be copasetic. There is a need to hold some amount of surplus for such risks, and what amount that is, I do not know.

MR. CODY: This is a difficult question to answer. Having determined a reasonable level of contingency surplus to cover the capacity utilized for the C-1, C-2 and C-3 risk and looking at the balance of surplus, you might begin to get an answer by saying: How low can this go without causing considerable discomfort to the Board of Directors. It is the comfort test. It varies from company to company. Dan, did you have some other bit of wisdom?

MR. MC CARTHY: Actually, it is your wisdom. I have liked the saying you had that particularly if you take a group of large and historically well-managed companies, the objective of management should be that their company is not the first such company to go under. The theory is that if the particular disaster would cause several such to go under, then government or somebody else will intervene and do something or it will be a society in which it won't matter anymore. Not being the first to go under is a useful measuring rod in some situations.

MR. VANDERHOOF: I would like to make one comment on another non-quantifiable risk to which this group may be particularly vulnerable, and that is the risk of an addiction to neatness and conservatism. I have lamented on a couple of occasions that the C-3 Task Force only concerned itself with fixed instruments. There are no equity instruments. That is something that I imagine will be rectified over a period of time. The reason it's important is that equity instruments can have neat properties like being inflation-adaptive, and they may also provide a higher yield. Now they do add some kind of risk to the portfolio, but one of the things that is never discussed is that even if you have very poor surplus, if the company is making a ton of money, you are probably all right. It is easy within a framework of this kind of thinking to say that we must not take any risk because it will make our position deteriorate. But it may be that taking very low risks with very low profit margins is the most dangerous thing you can do; and that it is much safer to take a higher-level risk if the profit margins have increased markedly. Usually those situations are not as neatly quantifiable, and they do not lead to nice comprehensive mathematical models, but even the valuation actuary must sometimes consider that making a ton of money is the safest way to run a company.

MR. CODY: In thinking of the valuation actuary's objective, one must remember that he is examining what capacity has been used by what has been done. He is not trying to set policy. Presumably he would have measurements available as to what the effect on surplus is of a particular action, which would be very valuable to the decision makers. But we have tried very hard in these task forces not to sit in judgment of management, and certainly not to prevent progress or worry everybody to death. You can set aside so much surplus that you do not have anything left to take risk with and to grow on, and that is a poor way to die.

MR. JOSEPH J. MORAN: All of the discussion today has been related to life insurance company risk. The same kinds of questions that are facing us in trying to determine appropriate reserves and liabilities and surplus for life insurance companies also apply in the casualty insurance field. Is there a counterpart Casualty Actuarial Society effort being mounted to deal with the same kind of questions and the relative differences of the importance of the various C-1, C-2, C-3 and C-4 risks in that field?

MR. CODY: The casualty actuaries are very concerned about this. I cannot speak as to the details of their planning, but I am sure, Mike, that you're glad that somebody talked about the casualty risk. Could you say some words about it?

MR. MATEJA: I do not know all that is being done in that area, but I am in an area of our company where casualty business is reviewed in the same manner as our life business, and I do know that there is somewhat greater concern about surplus levels in the casualty business than there is or has been expressed in the life business. No formal attempt to my knowledge has been made to quantify these things. There has been proposed legislation, as some of you may be aware of, and I think it was in Wisconsin and then Michigan, to try to set up surplus standards. The result of that was basically that the industry mounted a lobbying campaign saying, "Hey, just because you set up this formula and set up this amount of surplus, that is not going to insure solvency," any more than any other particular formula that you could come up with. Our company in particular has done a lot of work in early warning tests for the NAIC, developing new algorithms if you will, where you plug in certain ratios, and such, to identify those companies that could have surplus problems, but this entire question of how much is enough is never going to be answered with what I would call neat precision. If you will, the kind of logic that Van was indicating applies. There is just too much variation in our business to coin a key word or keynote kind of phrase at this meeting. There is no way in my mind that anybody could shed light on these questions in such a manner that you turn a crank and get the right answer. It is going to come back to the actuaries, I think, and management, shouldering more and more of the burden to understand what we are doing. I think that is the key.

MR. CODY: I think the risk lay-off system via reinsurance procedures in the casualty business is something that's always under formulation and consideration. If you want to worry about something, think about the asbestos problem.

MR. JULIUS VOGEL: Where do the dividends come in? Surely that is a part of the cushion that the actuary should consider. Couldn't he at least in theory knock off a billion dollars a year just from dividends?

MR. CODY: Yes, Julius, you will find in one of those papers I listed there is a credit given for dividends. You will also find that in all the work that several of us have done on the company level, we have taken credit for pass-throughs on IPG's. On the other hand, you will find that as far as the C-3 risk is concerned, strangely enough it seems to be higher for a mutual company than for a non-par company, which rather surprised me. The reason is that a mutual company pays out its margins through dividends as it goes along.

MR. CODY: Thank you all for your very rapt attention and for giving us an opportunity to spread our wares before you. You are going to hear much more from us in the future.