RECORD OF SOCIETY OF ACTUARIES
1982 VOL. 8 NO. 3

THE FUTURE OUTLOOK FOR STOCK COMPANY PROFITABILITY AND MUTUAL COMPANY SURPLUS POSITION

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1. Optimizing growth of companies so that marginal profitability reflects the marginal uses of surplus.

2. To what extent are current rates of surplus growth and current returns on surplus consistent with current growth rates?

3. How are companies managing profitability and growth?

4. What are the vital signs in monitoring the financial health of companies? How does one objectively measure the performance of a company?

MR. MICHAEL E. MATEJA: Success in business is a goal that ranks with winning in sports, victory in battle and similar examples of high achievement where one group is put in competition with another. The subjects to be addressed by this panel today, profitability and growth, are of vital interest to any business enterprise because they put dimension on the performance of the enterprise. In short, they provide a basis to define success in business. To outperform competitors in growth or profitability is to be successful in the business arena. Just as there are rewards to winners in sports, there are, of course rewards for being successful in business. For example, the financial marketplace handsomely rewards management and owners of successful companies.

I intend to present several ideas regarding the relationship between profitability and growth for an insurance enterprise, and share with you some industry data that relates to these ideas. They provide one basis to judge success in the insurance business.

Note that I said that the ideas I will present provide one basis to judge success in the insurance business. The concepts of profitability and growth unfortunately are not uniquely defined for an insurance enterprise. So, we must agree on a basis to measure them. The basis that one would choose would be greatly influenced by the intended use of the results. Thus, a financial analyst would likely concentrate on GAAP earnings per share and perhaps assets. A marketing executive might prefer to concentrate on premiums or amount of insurance in force and relate earnings to these bases.

I am going to look at profitability and growth through the eyes of a Corporate Actuary who has been charged with (1) assuring that the insurance enterprise remains statutorily solvent even in the face of extreme adversity, and (2) managing the surplus account of the insurance enterprise and determining when shareholder dividends may be increased and when surplus may be available for acquisition purposes. Thus, the primary focus will be on statutory financial results. This perspective is not necessarily the best for defining success in business but a good growth and profitability record on this basis is an essential prerequisite to successful performance viewed

from other perspectives. In theory, at least, if we view results over long periods of time, statutory and GAAP results will be about the same.

I will get into the details of the definition I have chosen in a moment. I need to digress for a moment and talk about the business of insurance from the perspective of a Corporate Actuary to provide a framework for you to understand the basis I have chosen.

At a conceptual level, it is possible to think of the insurance industry as a producer of financial obligations of a contingent nature. When we sell an insurance contract we in effect "produce" a promise to pay in the event that certain contingencies occur. In our financial statements, the best indicator of the financial obligations created by our contracts are the liabilities. So, this balance sheet item provides a convenient basis to measure how much we produce and in turn how much we have grown.

Now, any Corporate Actuary worth his salt knows that there is risk in fulfilling insurance obligations or liabilities. An insurance enterprise holds surplus to manage such risks. As we look at growth of liabilities, therefore, we must also be concerned about growth of surplus which provides the financial muscle to manage the increased risk.

In developing a conceptual framework for our surplus structure, we adopted a "productive capital" view of surplus which provides a linkage between surplus and insurance obligations or liabilities. In somewhat oversimplified terms, this viewpoint suggests that surplus is the wherewithall that permits us to produce more insurance. Competitive pressures are such that we cannot charge our policyholders premiums large enough to assure that we can fulfill our obligations under conditions of adversity. Our surplus stands ready to make good on our promises. Thus, we need an increment to surplus to accept the incremental risk associated with an increase in insurance liabilities.

So, any effort to understand something about growth in our business within this conceptual framework must consider both liabilities and surplus. So much for stage setting! Let us now look at the definitions of growth and profitability that I have chosen:

Definitions

Adjusted Surplus	S_t = Capital and Surplus (page 3, line 30) Plus MSVR (page 3, line 25.1)
Adjusted Liabilities	L_t = Total Liabilities (page 3, line 26) Less MSVR (page 3, line 25.1) Less Separate Account Liabilities (page 3, line 25A) Less Variable Life (page 3, line 25B)
Gain from Operations	G_t = Net Gain from Operations (page 4, line 31)
Measure of Profitability	$P_t = G_t/S_{t-1}$ Assuming $\frac{S_t}{L_t}$ is constant for all t
Measure of Financial Strength	$F_t = S_t/L_t$

The definitions of surplus, liabilities and gain are fairly straightforward. Note that surplus is defined to include the MSVR which in turn is excluded from the liability base. Separate account and variable liabilities are also excluded from the liability base.

Some may object to the exclusion of separate accounts from the liability base and the inclusion of separate account earnings in the definition of gain. I believe this treatment is valid for separate account business where account participants bear the risk. In this case, separate accounts represent a service type operation of the company and are comparable to other services which a company may provide.

Where there are guarantees provided in separate accounts, as is the case with certain Group Pension GIC business, exclusion from the liability base would not be appropriate, since guarantees involve risk. It was not possible to conveniently make this adjustment on a consistent basis with the statutory data I had available.

The measure of financial strength has been included to show something about the relative growth of surplus and liabilities. Increases or decreases in this ratio should be of concern to a Corporate Actuary who is worried about solvency. Note also that if financial strength is maintained, growth in surplus will be proportional to growth in liabilities.

Let us now turn to some of the theory that relates profitability and growth. If we ignore capital gain or loss, reserve strengthening, and the other transactions which pass through the surplus account, we have a very simple relationship between profitability and growth which is presented below:

Relationship Between Profitability and Growth

$$\text{Let Dividend Rate } D_t = \frac{d_t}{S_{t-1}}$$

By Definition:

$$G_t - d_t = S_t - S_{t-1}$$

Then:

$$\frac{G_t - d_t}{S_{t-1}} = \frac{S_t - S_{t-1}}{S_{t-1}}$$

$$P_t - D_t = GR_t$$

Gain - Dividend = Growth

Note that it was necessary to introduce another definition - the dividend rate. Thus, the only increment to surplus is the difference between gain and the amount paid out as dividends. This leads to a rather simple relationship between profitability and growth - the profitability rate minus the dividend rate equals the growth rate, where all rates are expressed as a function of the surplus at the beginning of the year. This relationship is fundamental to understanding problems related to profitability and growth. It applies equally to stock and mutual companies.

Let us take a look now at some industry data which I put together relative to these ideas. The data is drawn from a base of statutory information that we maintain for our major competitors. There are 20 companies, 9 stocks and 11 mutuals, in our data base, and it represents about 60% of the industry based on liabilities.

Exhibit I shows what actually happened in recent years with our 20 company sample in the area of growth of surplus and liabilities. Several observations can be made from this data (I should point out that there is no significance to the choice of 1974 as a start year - it simply represents the earliest year in our data base):

- The compound growth rate for stock surplus and liabilities is about the same over the entire period. This would indicate that the stocks maintained their financial strength during this period.

- Mutual surplus has grown at a rate materially greater than mutual liabilities over the entire period. This would indicate that the mutuals materially improved their financial strength during this period.

- Liability growth rates in recent years have declined materially relative to the average growth rate over the 7 year period. I suspect that growth in separate account business, a trend toward term insurance and adoption of CRVM reserves by the mutuals are largely responsible for the recent declines.

- Surplus growth rates increased dramatically in 1980 and then decreased just as dramatically in 1981. Most of the change for the mutuals is attributable to their substantial common stock holdings which were up in 1980 and down in 1981. As will be apparent when we look at profitability results, poor 1981 earnings for all companies also contributed to the decline in 1981 surplus growth rates.

I prepared data which is presented in Exhibit I-A showing surplus and liability growth rates for the individual stock companies in the data base primarily to illustrate the substantial variations in performance among companies. Some companies really are more successful than others.

I thought it would be of interest to express the growth rates in "real" terms by adjusting for the CPI. Results on this basis are sobering because they reveal that this group is just about holding on in the battle against inflation.

Corresponding data for the mutual companies is presented in Exhibit I-B. I found these results surprising; it is apparent that on this basis for defining growth, many companies are losing ground relative to the CPI.

There is a message in these growth rates for the entire industry and it does not look like good news.

I was curious as to how our 20 company sample compared to the industry. Exhibit I-C shows a growth rate comparison to industry data provided by the ACLI. While the periods do not match, the results indicate that our 9 stock company sample produced growth rates representative of all stock companies through the 1970's. Similarly, liability growth rates for the

EXHIBIT I

20 COMPANY SAMPLE
SURPLUS AND LIABILITY GROWTH
(AMOUNTS IN MILLIONS)

SURPLUS

	1974	1980	1981	COMPOUND GROWTH RATE 74/81	79/80	80/81
STOCK	$ 2,212	$ 4,204	$ 4,340	10.1%	13.3%	3.2%
MUTUAL	5,954	13,745	13,525	12.4	18.9	-1.6
TOTAL	$ 8,166	$ 17,949	$ 17,865	11.8%	17.5%	- .5%

LIABILITIES

STOCK	$ 28,496	$ 54,109	$ 56,974	10.4%	9.1%	5.3%
MUTUAL	123,307	189,482	200,724	7.2	6.3	5.9
TOTAL	$151,803	$243,591	$257,698	7.9%	6.9%	5.8%

EXHIBIT I-A

STOCK COMPANIES
COMPOUND GROWTH RATES
1974 - 1981

COMPANY	UNADJUSTED		CPI ADJUSTED	
	SURPLUS	LIABILITIES	SURPLUS	LIABILITIES
AETNA LIFE	12.3%	10.6%	2.9%	1.3%
ALLSTATE LIFE	19.4	18.5	9.4	8.6
CONNECTICUT GENERAL	10.8	10.8	1.5	1.5
CONTINENTAL ASSURANCE	12.7	2.3	3.3	-6.3
LINCOLN NATIONAL	-2.0	9.8	-10.2	.6
OCCIDENTAL	2.1	2.1	-6.5	-6.5
PROVIDENT	10.3	9.6	1.1	.5
STATE FARM	20.1	14.7	10.1	5.1
TRAVELERS	9.1	12.6	0	3.2
STOCKS	10.1%	10.4%	.9%	1.2%

EXHIBIT I-B

MUTUAL COMPANIES
COMPOUND GROWTH RATES
1974 - 1981

COMPANY	UNADJUSTED SURPLUS	UNADJUSTED LIABILITIES	CPI ADJUSTED SURPLUS	CPI ADJUSTED LIABILITIES
BANKERS	21.9%	15.8%	11.7%	6.1%
CONNECTICUT MUTUAL	9.1	7.7	-.1	-1.3
EQUITABLE	12.7	8.2	3.3	-.8
JOHN HANCOCK	11.7	6.6	2.4	-2.4
MASSACHUSETTS MUTUAL	14.3	8.6	4.7	-.5
METROPOLITAN	12.6	6.5	3.2	-2.4
MUTUAL LIFE OF NEW YORK	9.8	9.4	.6	.2
MUTUAL OF OMAHA	13.1	8.5	3.6	-.5
NEW YORK LIFE	13.0	6.8	3.6	-2.2
NORTHWESTERN	11.9	7.1	2.5	-1.9
PRUDENTIAL	12.0	6.2	2.7	-2.7
MUTUALS	12.4%	7.2%	3.0%	-1.8%

EXHIBIT I-C

GROWTH RATE COMPARISON
AETNA 20 COMPANY SAMPLE VS. INDUSTRY

	STOCK		MUTUAL		TOTAL	
	AETNA 20-CO. SAMPLE	INDUSTRY	AETNA 20-CO. SAMPLE	INDUSTRY	AETNA 20-CO. SAMPLE	INDUSTRY
SURPLUS	10.1%	9.7%	12.4%	8.1%	11.8%	8.0%
LIABILITIES	10.4	10.8	7.2	6.7	7.9	8.2

AETNA 20-COMPANY SAMPLE - GROWTH RATES OVER 1974-1981 PERIOD

INDUSTRY - GROWTH RATES OVER 1970-1980 PERIOD

industry and our 11 mutual company sample are comparable. But, the mutual company surplus growth rate for our sample at 12.4% was significantly higher than the industry growth rate at 8.1%. I believe both numbers are accurate so the logical explanation is that surplus growth rates for the rest of the mutual companies were very low.

Exhibit II shows financial strength and profitability ratios for the 20 company sample over the last 8 years.

- Note that the stock surplus to liability ratio has remained relatively constant over the period. This is consistent with surplus and liability growth rates presented in previous exhibits.

- One is tempted to speculate as to the underlying reasons for the increasing trend in mutual company financial strength and I believe that it can be attributed in part to Mod-Co.

- The trend in profitability is up as would be expected over the period, but the dramatic increase in profitability for the mutuals was a surprise to me. I suspect Mod-Co is again responsible. It is apparent that 1981 was not a very good year for all companies.

- For stock companies, the average rate of profitability over the period was about 21%. About 50% of this gain or an average of 10.6% was paid out in dividends to shareholders, and the balance of 10.5% was thus available to finance growth. You will recall that in Exhibit I-C we developed actual growth rates of 10.1% and 10.4% for surplus and liabilities, respectively.

- For the mutual companies, the average gain from operations was about 8.0%; all of which was available to support growth. Mutual liabilities over the period grew by only 7.2% so that a small part of earnings was available each year to increase financial strength. The actual surplus growth rate for the mutuals was 12.4%. The extra surplus growth came primarily from capital gains which over the period amounted to about 65% of the gain from operations. Mutual companies historically have maintained much higher levels of common stock, and for the companies in our sample, the ratio of common stock to surplus was 54% for the mutuals as of year end 1981 compared to about 20% for the stocks.

I want to take a moment to illustrate a point that I made at the outset that conclusions reached regarding profitability and growth would be influenced by the basis chosen to measure them. Exhibit II-A shows two bases for calculating a surplus to liabilities ratio, a common measure of financial strength. The "Gross" column shows the surplus to liabilities ratio using unadjusted figures from the statutory statement. The other column shows the adjusted ratio used in previous exhibits.

Too quick an examination might suggest that stocks have been losing financial strength while the mutuals have been maintaining their strength. Adjusting for the MSVR and Separate Accounts suggests a much different result, viz, that the stocks have maintained their financial strength while the mutuals have increased their's substantially.

The problem of choosing a basis for comparison can be further clouded as illustrated in Exhibit II-B where I have adjusted the liability base for

EXHIBIT II

20 COMPANY SAMPLE
SURPLUS AND PROFITABILITY RATIOS

	STOCK		MUTUAL	
	S_t/L_t	G_t/S_{t-1}	S_t/L_t	G_t/S_{t-1}
1974	7.8%	17.3%*	4.8%	2.1%*
1975	7.6	17.5	5.4	1.9
1976	7.6	20.8	5.9	6.2
1977	7.5	23.7	5.5	9.4
1978	7.3	23.9	5.9	12.0
1979	7.5	24.4	6.5	11.6
1980	7.8	23.4	7.3	12.5
1981	7.6	19.0	6.7	7.6
1974/1980 AVERAGE	7.6	21.1	5.7	8.0
PORTION PAID TO SH		10.6		0
PORTION RETAINED FOR GROWTH		10.5		8.0

*ESTIMATED

EXHIBIT II-A

SURPLUS TO LIABILITIES RATIOS

	STOCKS		MUTUALS	
	GROSS	ADJ. FOR MSVR, SA	GROSS	ADJ. FOR MSVR, SA
1974	7.1%	7.8%	4.3%	4.8%
1975	6.7	7.6	4.5	5.4
1976	6.2	7.6	4.3	5.9
1977	6.1	7.5	4.2	5.5
1978	5.9	7.3	4.3	5.9
1979	5.9	7.5	4.5	6.5
1980	5.9	7.8	4.8	7.3
1981	5.8	7.6	4.8	6.7

EXHIBIT II-B

SURPLUS TO LIABILITIES RATIOS

	STOCKS			MUTUALS		
	GROSS	ADJ. FOR MSVR, SA	ADJ. FOR MSVR, SA & POL. LOANS	GROSS	ADJ. FOR MSVR, SA	ADJ. FOR MSVR, SA & POL. LOANS
1974	7.1%	7.8%	8.2%	4.3%	4.8%	5.3%
1975	6.7	7.6	8.1	4.5	5.4	6.0
1976	6.2	7.6	8.0	4.3	5.9	6.5
1977	6.1	7.5	7.9	4.2	5.5	6.1
1978	5.9	7.3	7.7	4.3	5.9	6.5
1979	5.9	7.5	7.9	4.5	6.5	7.2
1980	5.9	7.8	8.2	4.8	7.3	8.1
1981	5.8	7.6	8.1	4.8	6.7	7.7

policy loans as well as the MSVR and Separate Accounts. Such an adjustment conceptually seems appropriate since policy loans represent a riskless asset which could be deducted from both assets and liabilities without distorting the balance sheet. On this basis, the relative strength of both stocks and mutuals are comparable, though again the mutuals have gained considerably over the past few years.

It is possible to graphically illustrate the relationships among the financial variables we have been considering. For this purpose I want to remind you that it is best to think of the relationships as averages or trends over long periods of time rather than as discreet results for one year.

The first graph, shown in Exhibit III, illustrates the simple linear relationship between profitability and growth. It is generally applicable at any level of capitalization. The top line indicates that in the absence of dividends, all earnings would directly increase the surplus account. In accordance with our productive capital viewpoint, the increase in surplus would be available to support a proportionate increase in liabilities (provided, of course, that the new liabilities have the same risk characteristics as existing liabilities).

The bottom line assumes a dividend equal to one-half of the gain or profitability rate, which seems reasonable based on the stock company results for the period of our study. The bottom line has been labeled the maximum self-financed growth rate. Assuming the surplus to liability ratio was to be maintained, growth of liabilities in excess of rates defined by this line would require additional capital. Otherwise, the financial strength of the company would be diluted. Alternatively, growth at rates less than that defined by this line would permit a release of capital or increase the financial strength of the company.

If a company finds that profitability and/or growth rates at a particular level of capitalization are unacceptable, one approach to achieving the desired result would be to change the level of capitalization or financial strength.

Exhibit IV shows how profitability and growth rates vary relative to the level of surplus. In constructing the exhibit, I assumed that the amount of profit and dividends remain constant. As would be expected, a reduction in surplus requirements would increase profitability and supportable growth rates, while an increase in surplus requirements would produce the opposite effect. These relationships are likely to be valid over relatively small changes in the level of surplus. Larger changes would usually be accompanied by fundamental changes in profitability.

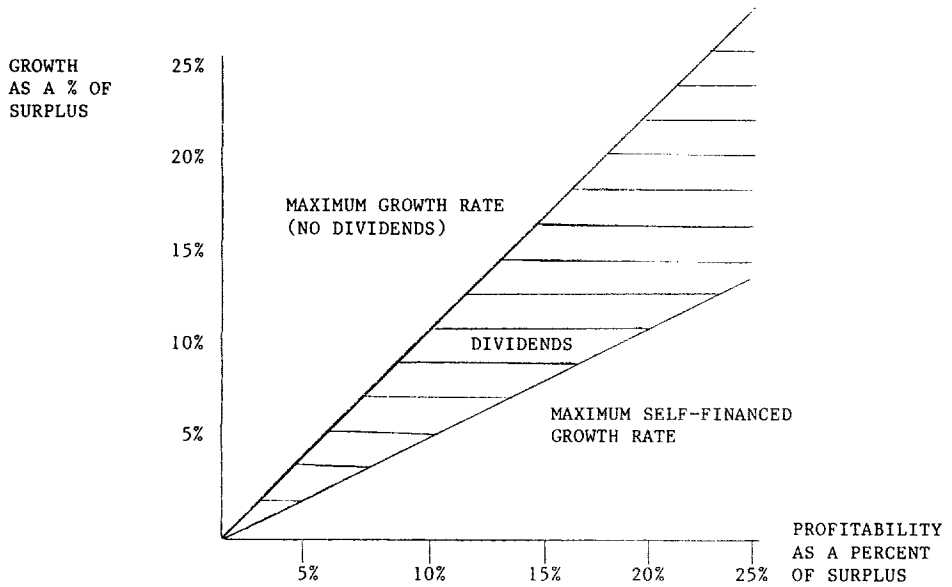
An interesting point apparent from this exhibit is that there is not much flexibility in growth rates. Thus, for instance, it would be impossible to materially increase growth rates without a serious erosion of financial strength or a sharp curtailment of dividends. Another alternative, of course, would be a large infusion of capital, but capital could only be attracted if the returns were attractive relative to other investment alternatives.

Let us take a moment to summarize some of the points I have made about profitability and growth. Let me remind you again that profitability-growth relationships are best viewed as trends over long periods of time.

(1) A company must be profitable to grow.

EXHIBIT III

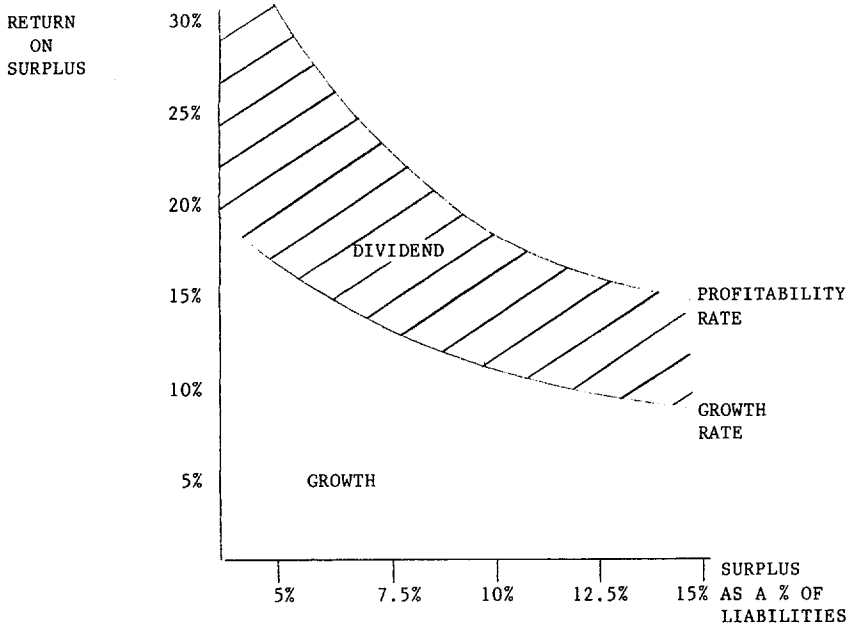
PROFITABILITY - GROWTH RELATIONSHIP



GAIN - DIVIDEND = GROWTH

EXHIBIT IV

PROFITABILITY - GROWTH - FINANCIAL STRENGTH RELATIONSHIP



ASSUMPTIONS: AMOUNT OF PROFIT AND DIVIDEND CONSTANT.

(2) The profitability rate represents the upper limit on self-financed growth (under the assumption of no dividend pay-out and no erosion of financial strength).

(3) The shareholder dividend policy effectively determines a company's ability to grow.

(4) Profitability and growth rates are inversely related to surplus requirements; thus, profitability and/or growth may be increased at the expense of financial strength, but the increases are modest over the reasonable range of surplus requirement levels.

I have one final thought about profitability and growth that I would like to share with you. In a competitive marketplace, surplus levels, price (which determines earnings) and dividend rates are all subject to competitive forces. If a company maintains competitive practices in these areas, the primary determinant of growth rates is the marketplace. An individual company can achieve differentially better results only if it is able to realize marginally greater earnings from a competitively determined price. This leads to concepts of efficiency and expense control which in my judgment are the first lines of defense in achieving superior growth and profitability.

The foregoing discussion suggests that there is a relatively straight-forward answer to the question of vital signs in monitoring the financial health of companies. Measures of profitability, growth and financial strength represent the cornerstone of any objective basis to monitor the financial health of companies. Measures of premium, volume and expense all contribute to a better understanding of these basic measures of financial health. Both current year results and trends over a period of years for the company and the industry, or a segment of the industry, are required to make an intelligent assessment in this regard.

Profitability and growth statistics are merely the outward manifestation of the results achieved by the management of a company. In the final analysis, a management team with a good track record is perhaps the best indicator of the financial health of a company.

MR. IRWIN T. VANDERHOOF: This topic has been so very clearly formulated that it almost seems that the best kind of discussion would be one in mathematical terms. While I do not plan to provide that kind of discussion, it seems interesting to me to discuss for a moment the values and problems of thinking and trying to communicate using such a clearly mathematical framework for thought.

Most of us remember our earlier education in economics. I am glad to be able to tell you that economics is still proceeding happily along its theoretical way. Theoretical economics develops equations describing the behavior of individual firms and aggregates of firms and generally ignores whether values can ever be attached to the various parameters of the equations. In economics, we will structure solutions in terms of demand and supply curves. Even if the world were so simple that all demand and supply curves were only straight lines, it would still be likely that we would not be able to evaluate these functions. The same situation exists in the field of finance and any of the other social sciences. While we may be able to formulate theories, we may not ever, even in theory, be able to verify which of several competing theories is correct; and we will surely never be able to calculate all the parameters for our equations to be able to actually show how they fit the data.

After starting off with this nihilistic point of view, I will assert that there still is a reason for considering theory in making decisions. Our final business decisions are going to be based on judgment, as they always have been. Such judgment must be the final arbiter because, as I mentioned, our equations will never be completely solved. However, good judgment requires that we have access to information about all the important factors--and that we understand what the important factors actually are. This is the important role for theory and mathematical formulations, even when we cannot finally solve the real world problems as a mathematical problem.

That role is to expose to the business judgment of the decision-maker the important factors that should influence decisions and give some hint of their interrelations. Even if we can never really track down our supply and demand curves in nice equations, it is helpful in making decisions to think in terms of supply and demand curves. While we can never be precisely sure what the equations are that really represent our cost functions, short run or long run, we are better off when making decisions in thinking that there is such a function for our own businesses.

While we probably cannot establish whether we exist in an oligopolistic market, we are better off thinking in terms of the various signalling mechanisms and strategies of such a market than thinking that we exist in pure competition. On the other hand, maybe our markets are purely competitive, and in that case we had better have some idea as to how those markets operate and the way in which such a market limits or expands our choices. More and more often in the social sciences, generally, and business, in particular, we formulate equations and develop mathematical theories not because we ever expect to be able to solve them but, rather, because of the hardening and sharpening influence that such theories have on our ability to make decisions. Theories are useful to us, though perhaps as cultural background for decision-making rather than as a mechanical method of making such decisions.

I am sure that from this brief introduction you have guessed that I am not going to tell you how to "Optimize Growth, etc.------." The topic is phrased in mathematical and economic terminology, and I truly believe that the necessary data to solve it as a mathematical problem will never be developed. I will try to do something consistent with my opening remarks. I will try to discuss this topic in terms of the various dimensions of the problems, and show how the various factors can interrelate in the real world. The value will not be the creation of a mechanical method of solving the problem--you will still have to do that yourselves--rather, the value, to the extent that I am successful, will be the expansion of the number of factors that you consider in making decisions about control of growth and the relationship between different rates of growth and the profitability of various products and the needs of the company for surplus. This will form some kind of a matrix for making decisions so that, as those problems of our business that are susceptible to mathematical formulation and solution are actually solved for explicitly, we are able to put them into our thinking explicitly, and thereby reduce the number of items we can only guess at.

There is one clear area where, as a profession, we are formulating our problems in mathematical form and are actually solving them in similarly precise terms. That area is the question of the needs of companies for surplus. We are all familiar with the work of the Trowbridge committee and their ambitious undertaking is to determine explicitly and numerically the various kinds of needs

for surplus that companies have. There are now quite a few persons who should be commended for the work that has gone on so far. I would like to comment particularly on the work done by Don Cody. He has been one of the real driving forces keeping the entire operation moving along. I suspect that his role has been inadequately recognized so far.

In the last memo I saw from Don, he had expanded the kinds of surplus needs that a company has to four:

1) asset loss
2) experience losses
3) mismatching of assets and liabilities, and
4) other possible losses, such as tax cases with the IRS.

At least one very interesting aspect of this listing is that the various kinds of losses that are mentioned are largely independent. The need for surplus because of the danger of losses from defaults of assets is largely independent of the possibility of experience losses or the possible losses due to mismatching.

This is a very important insight into the decision about growth that I am discussing. Different kinds of growth can have differing kinds of impact on the needs of a company to have surplus to guard against insolvency. A company that has specialized in asset-high businesses will need to increase its surplus almost linearly with further increases in assets to protect against the risk of asset loss. If assets are going to grow at a rate of 10% per year and the amount of surplus needed to protect against this risk is 0.3% of assets, then the surplus must grow at 0.3% of the asset growth; and this is the profit margin required on the overall block of business to retain a safe level of surplus.

The growth-oriented approach towards profit margins was discussed more fully in a paper by Robin Lieke, but in principle one simple relationship is that, if there is a certain ratio required to be maintained between surplus and one of the parameters that measures risk and size, then the profit on the risk measure must be equal to the product of the surplus/risk ratio times the growth rate. This might seem to lead to a simple way of relating profit margins, growth, and surplus needs, and it is, for the case of simple expansion of a given kind of risk. If we are going to grow in the same direction as we have in the past, then we have stated the required relationship.

Things, however, are usually not so simple. Sometimes we can reduce risk. The risk of mismatching can be easily avoided, but in general most companies have become concerned about asset/liability matching too late. Since I believe that if you are right about something you should never let them forget it, I will point out that companies would not be in such trouble if they had listened to any of my speeches from 1968 on. Nevertheless, companies having gotten into such trouble, does the above simple formula properly relate their growth with their needed profit structures? I think not. A company with a need for surplus because of a massive mismatch can correct its problem even if it cannot sell assets and rearrange the portfolio.

It can do so through massive additional sales of high-asset products, investing the proceeds in such a fashion as to compensate for the mismatch. In this case, our little formula, based on a stable relationship between surplus/risk, will not work because we are changing the stable part of the relation. The marginal use of surplus related to growth is now showing a negative sign.

However anomalous this result might be, I think companies have successfully adjusted to the situation. It seems to me that many of the asset-oriented companies that invested hot, short money in long duration assets five years ago have caught onto the fact that company solvency can be better protected by selling a lot of business with no profit, or a negative profit, and investing to eliminate the mismatching problem, than by selling a smaller volume of normally profitable business. I think it is illegal to sell business at a loss, but it can sometimes be the best thing to do if it reduces the company's risk.

The asset mismatch is the most straightforward example of reducing risk by writing more business, but it is not unique. Mortality fluctuation risks can be reduced by writing immediate annuities in some volume to offset risk of increased mortality on life insurance, and, presumably, investments in the health care industry should, to some extent, compensate for poor medical benefits claim experience.

The more frequent and more important situation is where risks are orthogonal to one another. If a company's risk position is dominated by risk of asset loss, then the addition of some business where the risk is a fluctuation in a fluctuation in mortality will have a minor effect on increasing the risk posture. The reason is that the risk of loss of assets is totally uncorrelated with the risk of mortality fluctuation (except for the odd investment banker who jumps out the window). Therefore, while a company dominated by mortality risk would require a linear increase in surplus to compensate for an increase in mortality risk, an asset risk company would require a lesser increase in surplus because it can, in some sense, use the same surplus twice, once for assets and again for mortality.

A second rule for matching surplus needs with profit is that uncorrelated risks require less profit and surplus than highly correlated risks. The mathematical formula is basically that of the variance of several stochastic variables which may have varying correlation coefficients:

if $y = au + bv + cw$

$$\sigma_y^2 = \sigma_{u,v,w}^2 = a^2\sigma_u^2 + b^2\sigma_v^2 + c^2\sigma_w^2 + 2\left(ab\rho_{u,v}\sigma_u\sigma_v + ac\rho_{u,w}\sigma_u\sigma_w + bc\rho_{v,w}\sigma_v\sigma_w\right)$$

The formula for the variance of the sum shows clearly that an increase in the amount of a particular kind of risk can increase the total risk function more or less rapidly than the specific effect of the risk involved.

This has the interesting effect of advising each company to do as much business as possible in areas they know nothing about. All the high-asset companies should sell term insurance, and the term companies should sell SPDAs. And yet, that is a clear implication of the good thoeretical thinking. Profits are most favorably related to the increase in surplus needs when the surplus is used many times, because there are many different kinds of risks. I believe that this principle of risk diversification is ignored and intentionally disobeyed, even though almost all actuaries will admit its logic. Companies generally feel more comfortable doing the same old thing and maximizing their needs for surplus with growth rather than minimizing it. One

good solution would be for companies to deliberately accept reinsurance business of a kind orthogonal to the normal risk pattern and reinsure out to others the business they are most familiar with. Companies generally seem to be moving in the reverse direction.

After all this discussion, I guess we are coming down to a mathematical formula:

if $\sigma^2_{u,v,w}$ is the variance of the company composed of risks u, v & w, with volume measured a, b & c, then the profit we need for growth of a particular kind is a function of

$$\frac{\partial(\sigma_{u,v,w})}{\partial a} = \frac{1}{\sigma_{u,v,w}} \left[a\sigma^2_u + b\rho_{u,v}\sigma_{u,v} + c\rho_{u,w}\sigma_{u,w} \right]$$

We can argue that we have now answered the question posed by the topic. In mathematical terms, we optimize growth by selling each product up to the point where its marginal profit equals the marginal need for surplus that such growth imposes on the company. All we have really done is develop an efficient frontier for the risks of a company viewed as a securities portfolio of risks.

There is at least one further complexity that must be considered. The basic pattern of the topic is taken from economics, where marginal costs and revenues are crucial factors in decision-making, and the formal answer I enunciated was in terms of the mean variance analysis of portfolios of investments or of risks. The question and the answer are both proper as far as they go, but both classical economic analysis and mean variance portfolio analysis leave out the possible problems of time and capital markets.

The time problem is most important. New business this year has an impact on risk posture for a number of years in the future, and the profits from a business do not generally follow the convenient pattern of matching off with increased surplus needs. Even if the eventual profits match off with the needs for surplus, the needs may come early and the profits may come late. The problem here is one of scheduling.

A particular growth in a line of business must be judged not only on the potential eventual profits but also on the pattern of profits over time versus the additional risks over time. This really means that we are now dealing with a maximization-over-time problem, where a constraint exists every year that the risks of the company will not exceed the accumulated profits on the business. As a temporal linear programming problem, we can then set our constraints for each future year and maximize growth subject to the constraints. This will allow us to see that the product is favored which not only produces profits but produces them in the year they are needed considering the profits pattern and risk pattern of all the other products. Companies can theoretically do this.

It would now seem that we have made the problem complex enough, but there are a few remaining niceties. The first of these is that we have ignored capital markets. If, in fact, we have opportunities for excess earnings and need current surplus to achieve them, then we have a problem of access to capital markets. Stock companies can always, in theory, issue more stock and thereby increase risk-bearing capacity, but this method has costs and time disadvan-

tages and is not available to mutual companies. Fortunately, reinsurance makes the equivalent of direct placement debt available to produce surplus needed to finance profitable business. The relative costs of surplus through equity and reinsurance sources provide an interesting view of expert opinion of the risks inherent in the business today.

The final factor which has to be mentioned is the way we control the growth of our products. Economics assumes the existence of perfect markets. In the world of the economist, reduction of prices will produce any needed increase in volume. In the real world, a variety of techniques, including adjusting pricing, commissions, numbers of salesmen, etc., must be used to effect even minor control on sales.

In summary, a mathematical foundation for real business problems serves several functions. To the extent to which the math can be solved, insights concerning the operating of a company can be addressed. At the Equitable, we are actually trying to do such evaluations explicitly. However, even if the equations cannot be solved, if they are correctly formulated, they constitute a pattern of the factors that must be considered in rendering judgment.

I have illustrated this by discussing an approach toward the factors that impact the risk posture of the company and showing how that leads to an explicit formulation of profit goals for different products which may differ between companies. The discussion was concluded by a development of the need for consideration of the whole temporal pattern of profits and the opportunities that capital markets provide for even richer possibilities.

MR. JOHN H. FLITTIE: I am going to pick up with Mike's last point and briefly discuss performance measurement and the vital signs of health or imminent death of the life company, from the vantage point of a consultant primarily working with small and medium-sized companies and also working with life companies that are owned by non-insurance managements.

The first problem is to define the standard against which performance will be measured. Performance for most of these companies should be more inwardly directed, against mutually agreed upon objectives, rather than measured against industry standards or industry averages.

I would like to suggest also that the most important vital signs in measuring the financial health of a life insurance company are not just numerical measures, as these are often symptoms rather than vital signs, but rather, that the most important vital sign is what management is doing to cope with change, or even more importantly, to cause change.

The single most important vital sign of future financial health is for management to have a well-thought out business plan that is right for that particular company, which is periodically reviewed in the light of changing conditions in that company and in the industry. This plan must be accompanied by an action plan for implementation. Results can thus be measured against this business plan, as an integral part of the management process, on a quarterly or annual basis.

This plan, against which performance is measured, would normally have two parts. The first part is a long-term plan of three or five years, perhaps even ten years, which is a strategic plan as to where the company should go. This is developed after a hard, and often painful assessment of the strengths and weaknesses of the company in terms of their geographic and product line

market share, their reputation and other intangibles, financial and human resources, and perhaps their capacity to create innovation in the insurance marketplace. This self-assessment leads to a realistic look at what the company is and prompts a realistic objective as to market share and financial goals. It leads to a plan that says what the company can be rather than what management, and perhaps agents, wish the company could be.

If this is a stock company, the strategic objectives must measure up with the objectives that the shareholders set for the company (which are principally financial objectives). I think we have a viable ongoing situation when we can measure management's results against a plan. Of course, if the strategic plan leads to something that does not look satisfactory to the shareholders, we have the situation where there are mergers, or perhaps the necessary infusion of new capital that Mike talked about, to produce the desired results. Another possible result of a realistic assessment is a decision to be acquired, acquire, or perhaps look for a merger of equals.

A strategic plan is not a corporate financial model, although that certainly is one tool that must be used to answer one of the key questions that has to be answered before you can do any effective planning--will the current surplus, however you define it, self-fund growth and be satisfactory without going to the capital markets?

The second part of the standard against which performance might be measured is a set of action plans for implementing this long-term strategic plan for the company. This should include short-term financial projections and should provide measurable objectives that management has to accomplish. It should be very specific, not apple pie and motherhood things like "obtain more first-year premium" or "become more profitable," but rather "establish three test programs in mass marketing in 1983" or perhaps "reduce the loss ratio in health insurance to 100% in 1983".

This action plan, as a standard of measurement, reduces performance to smaller components that can be dealt with. This can be by product line, by department, by geographic area or function and reduces the measurement problem into bite-sized chunks so that you can adequately assess results in the various units that produce profits or losses in your company. In this situation it is the job of the actuary not just to react and point out what is wrong or what is going on, but rather to suggest what can be done about it and turn this measurement device into the first step toward improving profits.

Other quick and dirty vital signs of financial health or the ongoing well being of a life company might well be some of the following:

- management regularly measuring results on a return on investment basis;
- management highly involved in strategic planning;
- federal income tax planning built into every aspect of the company;
- management working on an incentive compensation program geared to the planning process;
- market share, either geographic or product line, holding stable or increasing;

- management regularly rechallenging and perhaps dropping existing programs or product lines, rather than continuing to proliferate the rate book;
- average premium per sale increasing;
- significant changes in the proportion of business reinsured for reasons other than tax reasons;
- the trend of unit expenses;
- the trend of the ratio of deferred policy acquisition cost to first year premium, in a stock company; or in a mutual company the trend of the ratio of total acquisition costs to first year premium;
- very importantly today for stock a company, the margins in the recoverability tests; and
- the proper matchup of assets and maturing liabilities about which Irwin spoke.

In summary, with the increasing diversity of life companies, their products, their marketing systems and their markets, performance measurement and vital signs are something that have to be designed individually for each company because what works with the giant mutual or the giant stock, may not be the right answer for the bulk of the industry.

MR. HERBERT WEISS: What surplus ratios are companies trying to attain and how do they justify these to their policyholders?

MR. VANDERHOOF: At the Equitable, we are trying to maintain a ratio calculated in a manner adjusted for the MSVR and other risk adjustments and which is on the order of about 4 1/2%. I do not think that kind of level has to be justified to policyholders. Over 10% is against New York Law for mutual companies and would seem to be excessive. I have not heard many comments to the effect that 4 or 5% was too large an amount. The level depends much on the risk complexion of a company, so that it is not really possible to tell what anybody else should or would be doing. A company that has totally individual, high premium, high dividend business may not have a need for surplus as high as 3 or 4%.

MR. MATEJA: The risk characteristics of a company are the primary determinants of what a company should try to achieve. Included in the assessment of the risk characteristics would be the dividends that a mutual company would normally pay out. From our sample, I determined that the mutuals were paying out dividends roughly equal to 50% of their surplus at the beginning of the year. So if we would think that the dividends are available on a basis of absorbing or managing risk, they become a dominant factor in determining what surplus a company might want to hold. So, dividend philosophy or practice would be an important determinant in the whole question of surplus levels.

MR. FLITTIE: Many of our clients are also concerned with asset mix and the characteristics and liquidity of assets, including, on the asset side, wholly-owned subsidiaries, as well as the more traditional things such as real estate, stocks, bonds. Therefore, the characteristics of the assets are perhaps most important in determining whether surplus should be 3%, 7%, 8%, or whatever.

MR. WEISS: What kind of surplus ratios would you expect for the different lines of business, specifically group insurance? And how might one approach the problem of trying to arrive at a "surplus by line of business" approach?

MR. WALTER S. RUGLAND: The State of Wisconsin is trying to suggest that there are appropriate ratios that can be applied by line of business to determine whether a company meets a surplus test. Most of the actuarial people that I have talked to say, and I agree with them, that this is a fallacious approach. You cannot, in fact, come up with an index that says, with the type of business structure that we have today, that this is all the surplus you need for this particular line of business. You must examine the structure of the line and determine on an almost customized basis, what would be the appropriate amount of surplus given the asset structure, the liability structure and the nature of business involved. So, I would hesitate to suggest that there are appropriate surplus ratios for lines of business.

MR. MATEJA: My company has spent a great deal of effort addressing that very issue as a means of determining the appropriate surplus to hold at the corporate level. I would suggest that you refer to a presentation that I made out in Anaheim last year on the effective use of capital. I talked a little there about what our company approach was. It is a highly individualistic, analysis, and straightforward statistical techniques can be used. We analyzed what kind of asset holdings we have, what the risk characteristics of the business are in terms of the pricing margins that we have, and other such things that will determine our profitability.

MR. VANDERHOOF: There are some general levels that could serve at least as a target. Something around 4 or 5% is good and is probably necessary for asset loss. You do not need much in the way of surplus for individual life. For interest guarantee business, you need pretty high levels of surplus, unless you are very well matched. The problem with that approach is that it says each risk is independent. Part of what I was saying was that you reduce your need for surplus in total by accepting orthogonal risks. If you have a bunch of annuities, then you should have a bunch of group insurance, because the total amount of risk surplus needed for the combination is less than two items taken separately. So, that approach is probably going to overstate surplus.

MR. PAUL M. WINOKUR: Mr. Mateja's comments were all based on statutory surplus and statutory gain from operations in the United States. Have you done any sensitivity tests for stock companies on a GAAP basis?

MR. MATEJA: The answer is no. Competitive data on a GAAP basis is just not as readily available as the statutory data.

MR. WINOKUR: It seems to me for the 10 or 12 stock companies you were examining, you could at least obtain the fundamental gain from operations and surplus on a GAAP basis. It that not correct?

MR. MATEJA: Yes, that is possible. Then it is a question of what you are going to learn relative to what you can learn on the statutory basis.

MR. WINOKUR: Then, is it your perception that the return on surplus or return on equity would not be materially different than what you have shown us in your exhibits?

MR. MATEJA: They will be different. Then you have to understand the relationships between what you get and the kind of return that I have defined versus a return on equity. In other words, we can determine for our company what the return on equity is and take a look at what that translates into on a statutory basis, and conclude that that kind of relationship would be comparable in other companies. I am not suggesting that there is an equivalence between return on equity and a gain divided by adjusted surplus, as I have done. But, given that I can determine that for my company and get a return on shareholder equity, then I can see what kind of a relationship I have. I can do the same for other large stock companies, and see just how comparable they are. Then, if we track this data, we have some idea of what direction the others are going.

MR. WINOKUR: I would also appreciate Mr. Flittie's comments, particularly from the standpoint of small or medium stock companies, with respect to surplus on a GAAP book value basis. Clearly 4-5% of assets on a statutory basis may translate into something completely different on GAAP.

MR. FLITTIE: I agree with your comments, but we do not have any figures put together for this. Certainly, I have seen that stock companies in the given comparison group will quite often keep score in that manner, and that is one of the key methods by which their managements want to measure performance. That is, how are we doing versus the other similar publicly-held companies?

MR. MATEJA: Forbes puts out a whole raft of financial data for the industry at large, and there is a section in the January publication that they have devoted to the insurance industry. It gives return on equity for stock companies and divides them among life insurers and multiple-line companies and the like. It provides a useful basis for you to compare your own company's performance, and it defines how it is calculated. A big problem when you get into any of these comparisons is definition.

MR. WINOKUR: I have also seen Standard and Poor's analysis and I believe they look at about 10 or 12 companies in three or four categories including life, general, multi-line and casualty and so on, and they presented averages which were quite interesting to follow over a five or six year period. It looked like almost all the companies were keeping up with inflation on a return on equity basis.

I would like to make one comment from the Canadian perspective. Since we have moved toward something closer to GAAP in Canada, we do have access to the report of the Federal Superintendent on a company by company basis, as well as the aggregate results. I did a quick analysis trying to remove the impact of certain mutual companies and certain stock companies which have very conservative reserves, such as cash value floors above the line, for the period 1978-1980 inclusive. For individual non-par life insurance, it was interesting to observe that the aggregate results were in the 15-18% range on a return on average equity basis, although the variation was as wide as from a low negative to a plus 30%.

MR. ROBERT M. ASTLEY: I would like to touch on some of the positions of the Canadian banks. I think it is instructive when we look at surplus levels to look at other financial institutions. The big five Canadian banks have a leverage of about 30:1; some of them are a little bit higher. That is assets to capital, or turned around the other way, would be about a 3.3% ratio of capital to assets. And surprisingly enough, some of those big five banks have

made loans to individual customers, big corporations, primarily for takeover purposes that have almost equaled or, in some cases, have exceeded their total capital. So their asset risk is substantial and there are a number of people in Canada who are quite concerned about the possibility of a major financial embarrassment, even though the banks are regarded as the pillars of the whole Canadian economic system. I would like to ask Mr. Mateja to put up the transparency again that showed growth in surplus and growth in liabilities for the stock companies. I was astonished to see the results of Allstate and State Farm, especially. The results for State Farm and Allstate are quite phenonomal, and I wonder if you would care to comment on how they are achieving those results.

MR. MATEJA: I think they are outperforming the industry, by a wide margin.

MR. ASTLEY: Can you look into that a little more deeply? I heard distribution system over here. Is that your view?

MR. RUGLAND: I like to call it an unambiguous distribution system, inherent in both companies.

MR. MATEJA: The basic relationship that we are talking about is simple if you go back to the gain minus a dividend equals growth, and I would not be at all surprised if you look at the details of the statement that there have been some very low levels of dividends taken out of the company and they have been using it as a source of growth. A gain in the 19% range is not an unreasonable goal for a company. It has been consistent with a 20% average, for the stocks. If they would just retain all of that they could grow with the rate. So, that would be my first guess.

MR. ASTLEY: The return on equity figures show up in your study, Mike, as substantially better for the stock companies than for the mutual companies. A similar anaysis does not reveal that for the Canadian companies; there does not seem to be any pattern between stocks and mutuals. I would be interested in any comments about what that startling difference means about the two different forms of organization.

MR. VANDERHOOF: It is not clear to me that any kind of aggregate figures or figures dealing with the largest companies are going to demonstrate a difference between stocks and mutuals, for a very peculiar reason: the very largest companies seem to have problems with growing and with expenses that are not present in companies of somewhat smaller size. There may be a diseconomy of scale if you look at aggregations, particularly with the mutual companies, dominated by a small number of very large companies where this problem may exist. The problem with diseconomies of scale is one that has interested me for a number of years. I have not really been able to pin it down yet, but it does seem to show up. It would not show up in the Canadian companies because they do not seem to be of the size where diseconomies of scale would arise.

MR. MATEJA: Individual company comparisons are difficult. I will use the Aetna as an example; we are a stock company, but we have a major share of our business in group insurance, which for all practical purposes is participating. It operates in much the same manner as a mutual company; we give out an experience refunds as opposed to a dividend. So, if you could isolate segments of the business, I would say that we were comparable in terms of what we are doing. The kind of return differentials that you see then reflect dif-

ferences in management performance. It gets back to the kinds of thoughts that John was reflecting in his assessment of the financial health of companies (incentives for managers and things of this nature).

MR. FLITTIE: I have observed that it is almost entirely the difference in what the driving force of the company is. In the stocks, almost unanimously the driving force is increase in profitability, and that is not necessarily the case in all of the mutuals.

MR. RONALD S. LEVIN: Mr. Vanderhoof, would you elaborate on how risk can be reduced by writing more business?

MR. VANDERHOOF: The situation is where an increase in the business in force, that is, growth, could reduce the total risk of a company. A mechanism for that would be, say, if we had a lot of deferred annuities inforce. With long-deferred annuities you can never have assets that are long enough. So your assets are always too short. You could sell immediate annuities and that would bring the liability structure in better correspondence with the assets you already had. So, you would reduce the mismatching risk by increasing the volume of business.

I do not know of a good way, right at the moment, where you reduce the asset loss risk by writing more business, but there probably is one. I guess you would buy stock in a bankruptcy firm. I think that the only risk that I can think of that can really in practice be reduced by increasing the volume of business is the mismatching risk. Mismatching of the duration of assets and liabilities. That can be reduced by adding more liabilities or adding more assets.