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Educational Note

Dynamic Capital Adequacy Testing

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EDUCATIONAL NOTE

DYNAMIC CAPITAL ADEQUACY TESTING

COMMITTEE ON SOLVENCY STANDARDS FOR FINANCIAL INSTITUTIONS

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MEMORANDUM

To: CIA Members Practising in the Insurance Area

From: Guy Engels, Chairperson,
Committee on Solvency Standards for Financial Institutions

Date: January 26, 1996

Subject: **Consolidated Version of "Dynamic Capital Adequacy Testing" Standard**

The existing DST standards are incorporated in the draft consolidated standards in Section 23 under the title "Dynamic Capital Adequacy Testing." This is a consolidation of the existing dynamic solvency testing standards for life insurers and fraternal societies and the draft standard for P&C companies.

This consolidated DCAT standard reflects extensive input received from a survey conducted by the Solvency Standards Committee in early 1994. A comprehensive questionnaire was sent to appointed actuaries of all life companies operating in Canada in order to obtain input for improvements to the existing standard. By that time, most companies had completed the dynamic solvency testing process for the second time, and we wanted to capture any input for areas of change to the standard. The survey results and anticipated actions were shared at a panel discussion at the March 1994 CIA General Meeting.

Generally, the respondents' comments indicated that they were satisfied with the existing standard and no major rework was required. The changes incorporated largely as a result of the excellent input received were:

- The 10 suggested scenarios were removed and replaced by a list of risks that the actuary must consider.
- The adverse scenarios would normally include at least three integrated scenarios.
- The main criteria for an appropriate adverse scenario are pertinence to the insurer and plausibility of occurrence.
- The actuary would report management action assumed within each integrated scenario.

It should be also noted that DCAT will apply only to the appointed actuary of an insurer. The current DST standard applies to the actuary whose work most closely resembles the work of a Valuation Actuary. For a provincial insurer, where an actuary does not have the legislated right of access to information and protections that an appointed actuary does, I wanted to clarify that DST is not required. However, if the work is done, it should be done following the standard.

The Solvency Standards Committee has also developed a draft educational note (enclosed) for the DCAT standard. It contains further information on:

- Risk Categories
- Sample Integrated Scenarios
- Sample Outlines of Reports

We are still in the process of developing P&C samples for these educational notes.

There have been very few comments received on the DCAT section within the proposed consolidated standards. Any comments on the proposed standard or the educational notes are welcome.

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DYNAMIC CAPITAL ADEQUACY TESTING (DCAT) EDUCATIONAL NOTE

I. RISK CATEGORIES

The actuary is expected to develop an understanding of the sensitivity of the future financial condition to each major risk category which is material for the company. Section 23.03 of the standard contains examples of major risk categories and possible adverse trends for each which could be considered.

This list should not necessarily be considered all-encompassing for every company. These examples are not listed in any order of presumed importance and should not be viewed as a mandatory list of scenarios. The Society of Actuaries' Handbook on Analysis Of Dynamic Financial Condition also is a good reference for risk areas that may be relevant for a company.

Plausible impacts to expected experience can be caused by:

(i) gradual changes to experience which may or may not go undetected for some time
(ii) shock changes to experience
(iii) incorrect estimates of expected experience

Recent industry and company historical experience and outlook for the future should be considered to determine the range in experience that should be tested.

II SAMPLE INTEGRATED SCENARIOS

The following are some generic examples of generalized economic scenarios that could be used. These are examples whose purpose is to give some guidance to actuaries on how to approach designing scenarios. These should not be considered to be scenarios that an actuary must run. They should also not be construed to be a "safe harbour" by themselves. The actuary must test scenarios which are appropriate given the circumstances of his/her company.

Some scenarios will result in sharp downward spikes in income. In many companies, the DST is normally presented to the board late in the calendar year. It may be more appropriate to show the adverse fluctuations starting in the second and later years of the projection. If you are through the majority of the first year by the time the DST is presented, the board may accept the DST projections as being more reasonable if the first year is reasonably consistent with the current year's experience.

Scenario 1 Severe Economic Adversity, with Rapidly Rising Interest and Inflation Rates

This is an adverse economic scenario in which there is a rapid increase in interest rates and inflation, all of which leads to general economic uncertainty in both the insurance and banking markets.

The assumption in this scenario is that the higher interest and inflation rates are not the results of a booming economy that is heating up. They are the result of an inflationary shock to an already weak economy.

In general, this scenario will assume two years of very rapid changes (i.e., increases in interest rates and inflation), starting with the second year of the projection. Rates will then come down a bit in the remaining two years.

Reserve assumptions can be changed every year, but, as a minimum, will have to be addressed at the end of the five-year projection.

These changes should be included by all lines in the company, including any financial subsidiaries.

Short-term interest rates show a significant increase. The amount of the increase will depend on the starting rate. For example, if the starting rate is 8%, increase the rates in this scenario by 400 basis points per year in each of the second and third years of the scenario, and then decrease by 100 basis points per year in the last two years of the projection. The increase will not be as great for the long-term rates.

There will be some effect on new money products if they are not managed to be exactly matched.

The increasing interest rates of this scenario may help a bit for some product lines.

Inflation increases correspondingly over the rate assumed in the base projection (i.e., by a 4% increased rate per year for the second and third years, and then decreased by 1% per year for the last two years). The scenario could assume that the company's costs increase at least with the inflation rate. If the actuary believes that management would react to control costs, then the effect on expenses could be lower than the increase in the inflation rate. As a result, in the short term, the company cannot totally manage to keep its costs in line relative to product margins.

This scenario assumes that interest margins on new money business will not be affected (i.e., the company will continue to be able to meet its pricing margins).

The amounts of new business is unchanged from the base projection.

Dividend rates are forced up, but based on the portfolio yields.

There will be a switch of new sales to products that reflect the increased new money rates better than the traditional products. This will also result in high lapses and churning of the business. The appropriate level of such higher lapses will need to be assessed for each product line.

For life insurance products, the higher lapses will result in worse mortality for the policies that remain in force. The appropriate level of such higher mortality will need to be assessed for each product line.

Since this scenario is not assuming a booming economy being the cause of the rate increases, it assumes that stock values decrease (i.e., stock yields are inversely related to interest rates). Assume that stock market values decrease by 25% in total over the second and third years, and then stay level for the next two years.

Real estate values are depressed and total yields are lower than for the base projection. Assume that real estate yields drop by 300 basis points over the five years.

The base projection requires assumptions for the level of mortgage and bond defaults. This scenario should assume the higher of (i) double the default level of the base scenario for the second and third years and reducing to the base assumption by the end of the fifth year, and (ii) a default rate by asset type equal to the MCCSR required factors for the second and third years and reducing to the base assumption by the end of the fifth year.

Prepayments of mortgages are assumed to go to zero.

Assume that bond calls go to zero.

This scenario assumes that there will be continuing difficulties experienced by other insurance companies. The CompCorp costs will be assumed to be at the maximum level for all five years of the projection.

It is assumed that because of the economic uncertainty, the company either cannot raise any further external capital, or it can only do so at much higher rates.

Scenario 2 Deflationary Economic Scenario

This is an adverse economic scenario in which there is a continuing decrease in interest rates and inflation. The following is a summary of the assumptions to be used for this scenario:

In general, this scenario will assume two years of declining interest rates. Rates will then stay level for the remaining years.

Reserve assumptions will have to be addressed at the end of the five-year projection.

These changes would be included in all lines in the company.

Short-term interest rates will decrease to half the base projection assumptions during the second and third years of this scenario. Long-term rates will decrease by the same number of basis points. The rates will stay at these levels for the rest of the projection.

There will be some effect on new money products if they are not managed to be exactly matched. This matching of assets and liabilities is also an issue that any financial subsidiaries have to address.

Inflation should decrease to 1% for all years. The scenario assumes that the company's costs decrease from the base projection consistently with the inflation rate.

Since the last two years of the projection are stable, the new business sold by the end of the projection period is assumed to include the lower costs in the pricing. Each line is looked at individually to assess the proper treatment of expenses for the in-force (e.g., do the reserve assumptions need to be changed?).

This scenario assumes that interest margins on new money business will not be materially affected. However, as interest rates go lower, one result may be that companies are not able to maintain the current pricing margins.

The amount of new business is not different from the base projection.

Dividend rates can be assumed to go down consistently with what the company has done the last few years in practice (e.g., with a lag compared to the portfolio yields).

Lapses on the traditional insurance products could improve under this scenario. The appropriate level of lapses is assessed for each product line.

The minimum guaranteed rates may come into play for some product lines, and the costs of this have to be assessed for each product line. This can have a major effect if it happens, and, therefore, should be investigated closely. However, as rates go down, one can assume that the minimum guaranteed rates in new business will be adjusted downward in pricing.

The effects of market value adjustments have to be considered for new money products.

This scenario assumes that stock values, because of the continuing economic uncertainties, will decrease in total by 25% in the second year of the projection, and then recover over the following years.

Real estate values will be depressed (i.e., lower than in the base projection) due to the general economic uncertainty.

The base projection contains assumptions for the level of mortgage and bond defaults. This scenario assumes the higher of (i) double the default level of the base scenario for the second and third year and reducing to the base assumption by the end of the fifth year, and (ii) a default rate by asset type equal to the MCCSR required factors for the second and third years and reducing to the base assumption by the end of the fifth year.

Prepayments of mortgages are assumed to double.

Calls on bonds will increase under this scenario.

This scenario assumes that there will be continuing difficulties experienced by other insurance companies. The CompCorp costs will be assumed to be at the maximum level for all five years of the projection. Similarly, if the company operates in the U.S., higher guarantee fund assessments are assumed.

Scenario 3 Claims Experience – Deterioration of the Mean

A company which has a significant block of life insurance, annuity, health or P&C policies will likely want to test the effect of gradually deteriorating claims experience. The testing is done separately for each of these lines of business. The trend over recent decades has been to improved overall mortality experience. This may have been incorporated in pricing or in annuity valuation, implicitly or explicitly.

To test the sensitivity, the following are examples of what could be assumed:

a. For life insurance, there will be a 2% deterioration in mortality experience in each year of the five-year projection. This should affect all insurance product lines, both individual and group.

b. For annuity products with life contingencies, assume double the improvement already built into the valuation assumptions.

c. For health insurance, assume a 2% deterioration in morbidity experience.

The actuary should not rely solely on the above examples, but should determine what is reasonable for the company given its past experience and the level of PADs already included in the reserves.

At the end of the five years, there is assumed to be no further deterioration. The effects of the extra mortality during the five years of the DCAT projection will be seen in increased costs for claims. However, the larger effect will be the revaluation of reserves to include the continuation of the higher level of claims in future.

It could be assumed that this scenario will have no effect on individual and group deferred annuities or on any deposit-taking financial subsidiaries.

The actuary should consider all the other DST assumptions to see if they should change. For instance:

a. When will management react to change pricing? For life insurance and annuities, at least three years of delay should be assumed before there is remedial action. For health insurance and P&C, a short reaction time, such as 1.5 years, could be assumed.

b. When will policyholder dividend scales be affected? There likely will be a delay in management reaction, similar to the pricing delay.

c. Will new sales be affected? For instance, if the actuary assumes that this deterioration in claims affects only his/her company and not the industry at large, then an increase in price would affect the company's competitive position.

d. Will lapses be affected if there is an increase in price or a reduction of policyholder dividends?

Scenario 4 Very Adverse Fluctuation in Claims Experience

The purpose of this scenario is to test the effects of very adverse fluctuations around the mean for claims experience. How sensitive the company is to probable fluctuations in its basic experience is something that would likely be tested. Extremely adverse experience, but which could reasonably be expected to happen, is an event which the company should be able to survive.

The actuary reviews the historical claims levels the company has actually experienced in the past, and uses the highest experienced level of mortality. In simplistic terms, you would likely assume the worst experience year in 20 years happens in the second year of the projection.

For more conservatism in the scenario testing, you can assume that this significantly higher level of claims occurs for two years in a row.

It is then assumed that mortality goes back to normal levels for the remaining years of the projection. Reserve assumptions at the end of the five years do not have to be changed.

This scenario would likely be done for each major line of business separately.

This scenario could affect the following lines of business:

i) life insurance
ii) life annuities (i.e., improved mortality)
iii) group life and health (i.e., mortality and morbidity)
iv) individual health
v) P&C subsidiaries

The results would then be shown separately for each of the above types of lines. The actuary would not offset between the insurance and annuity lines.

It is assumed that this scenario will have no effect on individual and group deferred annuities or on the banks and trust companies.

This scenario could affect any external capital that is planned to be raised. If the scenario results in negative net income, one could assume that the company does not have the option of raising external capital for at least two years.

The actuary should consider whether this scenario will cause cash flow problems.

The actuary should also consider management reaction. For instance, will policyholder dividends be changed? Will shareholder dividends be curtailed?

Scenario 5 A Liquidity Crisis for the Company

The purpose of this scenario is to project the effect on the company of a major lapse/liquidity problem. In this scenario, only the company in isolation is affected, and this scenario does not apply to the industry in total.

This scenario could be generated by sudden lack of confidence in the company, as perceived by the outside market. An example could be a sudden downgrade by external rating agencies, combined with extensive publicity. The perception of a problem could be self-fulfilling. This was a contributing factor for Mutual Benefit and for Executive Life. Such a lack of public confidence also precipitated the O&Y cash crisis.

The assumption can be made that this crisis does not last for the full five years. Its effects are felt very powerfully for the two-year period starting at the beginning of the second year of the projection.

None of the assumptions for interest rates or inflation are affected for this scenario. This scenario affects the company's lapses and new business.

The company cannot borrow any external capital or debt, such as any commercial paper, subordinated debt, preferred shares, etc. Any existing borrowings cannot be renewed at maturity.

The company experiences a sudden virtual stoppage in new annuity business. There are minimal roll-overs at maturity. The appropriate level of lapses should be assessed for each product line. There are high levels of surrender even with the existence of market value adjustments or surrender charges.

The company experiences much higher lapses in the individual insurance blocks. Again, the appropriate level of lapses should be assessed for each product line. The mortality experience of the policies that remain should be assumed to be worse due to antiselection. The scenario should assume that dividends are not changed.

The company will experience lower new insurance sales, but cannot proportionately cut expenses.

Any of the company's subsidiaries would experience similar effects, and it is assumed that the company will continue to back all its subsidiaries.

Assumptions with respect to selling non-liquid assets would be very conservative.

Scenario 6 Loss or Deterioration of a Major Profitable Line of Business

The purpose of this scenario is to investigate the effect on the company of its losing its most profitable line of business. This could be due to any of the following causes:

- A change in key tax legislation
- The massive entry of banks into the market, resulting in an elimination of any profit margins for several years
- The entry of several competitors into a market previously dominated by the company
- A major change in a country's consumer legislation
- Political turmoil

The company will lose, or very sharply curtail, its ability to continue to generate new sales in its most important profitable line of business.

The company will not be able to cut its expenses immediately, especially its overhead expenses.

Scenario 7 Loss or Significant Decline in Value of Major Asset Category

The purpose of this scenario is to investigate the effect on the company of the total loss, or a significant reduction in value, of a large asset category. While this is probably considered improbable by the company, it has happened in practice in the past. Some examples are:

- The effect of the collapse of the junk bond market on Executive Life of New York
- The major decline in some very large real estate developments for Equitable Life
- The decline in value of some large subsidiaries of Les Coopérants
- The large default rate of commercial mortgages and the low real estate earnings of Confederation Life.

The actuary would test what may be considered improbable, since in doing so he/she may uncover that the company has been set on the outcome of one view of the future.

The intention would be to test a specific vulnerability that the company may have. For example:

- If a company owns a subsidiary that is earning 10% and is relying on this income, what happens if the subsidiary starts to earn only 3%?
- What happens if the company makes a major purchase of a block of business from another company and it turns out not to be profitable?

Scenario 8 Other Scenarios

The actuary should look at the specific circumstances of his/her company and test scenarios accordingly. For example:

- If the company has a material amount of term to 100 business, what is the effect of a 1% lapse rate?
- If the company has a material amount of reinsurance ceded, what is the effect of its largest reinsurer going insolvent?
- If the company has international investments or operations, what is the effect of large, unexpected currency shifts?

III. SAMPLE REPORT OUTLINE

1. Executive Summary

- summarization of scenario results (MCCSR, profitability, liquidity, and ratings implications)
- highlight most significant solvency risks

2. Introduction to DCAT

- purpose, scope, process, method

3. Capital Adequacy Measurement (MCCSR)

- description and current position

4. Base Scenario

- description of scenario, assumptions, results
- discuss consistency with business plan

5. Adverse Scenarios

- description of scenarios, assumptions, results
- comparison with scenarios tested previous year

6. Analysis of Risks by Line of Business

- discussion of risks and scenario results

7. Conclusions and Recommendations

- summary and future developments

8. Appendices

- key corporate objectives/initiatives
- capital enhancement activities
- key assumptions
- other considerations (rating agencies, taxation, valuation/accounting issues)