



AMERICAN ACADEMY *of* ACTUARIES

Introduction

This practice note was prepared by a work group organized by the Life Valuation Subcommittee of the American Academy of Actuaries. The work group was charged with updating the initial practice note written in 2001 regarding the Actuarial Standard of Practice No. 40 (ASOP 40), and current practices used by actuaries in the United States under the National Association of Insurance Commissioners' (NAIC) Model Regulation XXX. This revised version of the practice note reflects the adoptions of Actuarial Guideline XXXVIII, the 2001 CSO tables and the 2001 CSO Preferred Class Structure tables.

The practice note represents a description of practices believed by the work group to be commonly employed by actuaries in the United States in the year 2006. The purpose of the practice note is to assist actuaries who are faced with the requirement of satisfying Model Regulation XXX. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice note provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. This practice note has not been promulgated by the Actuarial Standards Board, nor is it binding on any actuary.

Comments are welcome regarding the appropriateness of the practice note, the desirability of an annual updating of the note, the validity of substantive disagreements, and any other issues that may arise. Comments should be sent to Amanda Yanek at yanek@actuary.org.

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Unless otherwise noted, the section references are to ASOP 40.

Section 1. Purpose, Scope, Cross References and Effective Dates

Section 1. Scope

1. *What practices are typically used to value products with secondary guarantees under this Model Regulation?*

As described in Section 7 of the Model Regulation, products with secondary guarantees are subject to the regulation. Section 7 gives examples of products with secondary guarantees and the prescribed reserve calculation. The revised Actuarial Guideline XXXVIII, which was adopted by the NAIC in 2006, provides additional guidance regarding the valuation of products with secondary guarantees. See questions 53 through 57 for additional information.

2. *Are the 19-year select mortality factors for the base reserve, or the X factor for deficiency reserves, typically used for products that are excluded from the Model Regulation?*

No. The 19-year select factors, from the Appendix of the Model Regulation, applied to the 1980 CSO mortality are for the XXX products.

3. *To what extent does the Model Regulation affect Group Life insurance products?*

Section 3 of the Model Regulation lists products, including certain group life products that may be exempted. Section 3(A)(5) exempts group life unless there is a stated or implied schedule of guaranteed premiums. However, some actuaries believe that, due to immateriality, group term life plans with premium guarantees of less than two years may not require testing under this regulation. This is in recognition of the common industry practice of guaranteeing the premiums for slightly longer than 12 months in the first year of a group term life contract.

In such a case, any X factor testing may not apply or it may be immaterial. Some actuaries and regulators believe that group contracts with rate guarantees in excess of two years, for which the premium rate guarantee is given to the employer (as opposed to an employee), may be excluded from X factor testing. In this case, it is usually prudent for the actuary to consider contacting his or her state regulator.

Section 3. Analysis of Issues and Recommended Compliance

Section 3.1 Regulatory Requirements

4. *If a company uses any X factor less than 100%, must it file an asset adequacy analysis annually?*

Yes. Section 5(B)(3)(i)(ii) of the Model Regulation requires that an asset adequacy analysis be performed annually on the company's entire in-force block of business. Therefore, if a company uses any X factor less than 100%, the following two annual Actuarial Opinions are required:

- Actuarial opinion and memorandum covering asset adequacy in conformance with the requirements of the Actuarial Opinion and Memorandum Regulation (AOMR) covering asset adequacy; and
- Actuarial opinion and supporting report, covering X factor appropriateness.

5. *When are the actuarial opinion and memorandum on X factors due?*

The Model Regulation states that the actuarial opinion and supporting actuarial report on X factors should be prepared annually, but it is silent on the actual due date. Some regulators expect that the X factor opinion (and memorandum if requested) will be filed at the same time as the annual statement and actuarial opinion. Many actuaries believe that the X factor opinion (and memorandum if requested) should be filed at the same time and in the same manner as the annual statement opinion and memorandum.

6. *If the select mortality factors are used for deficiency reserves, does the Model Regulation require such factors to be used for basic reserves?*

Many actuaries believe the answer to this question is no. They do not believe there is any wording in the Model Regulation that indicates that the company's decision on select mortality factors for basic reserves is dependent on its decision of select mortality factors for deficiency (or minimum) reserves.

7. *If reserves based on the select mortality are greater than the basic reserves at any duration, yet the calculated net premiums for minimum reserves are always less than the guaranteed gross premiums, does the Model Regulation require one to carry any deficiency reserves?*

Many actuaries believe that there is no reason to hold deficiency reserves in this situation. According to the Standard Valuation Law (SVL), deficiency reserves are only required if the net premium for minimum reserves is greater than the guaranteed gross premium at any duration.

8. *If the company elects to use X factors for deficiency reserves, does the Model Regulation require select mortality be used for deficiency reserves?*

Yes. The Model Regulation provides that the X factor can only be applied against the select mortality. For a 1980 CSO product, the select mortality factors from the Appendix of the Model Regulation are typically used. For a 2001 CSO product, the X factor can only be applied against the 2001 CSO select mortality. See Q&A 20 for more information on this issue.

9. *In determining whether deficiency reserves are necessary, are minimum reserves, which are typically compared to basic reserves, based on mean reserves or mid-terminal reserves?*

In most situations the comparison is based on the type of basic reserves held. Some actuaries consider it desirable that a consistent method be applied across a product line in performing this comparison.

10. *Does the Model Regulation permit a company to use one mortality basis for basic reserves and a different one for minimum (deficiency) reserves (e.g., composite vs. smoker/nonsmoker separately)?*

For deficiency reserves, the SVL discusses the minimum standards allowable rather than the basis used for a contract's base reserves. However, there is disagreement among actuaries as to whether or not the same mortality basis must be used for basic reserves and minimum reserves. Whichever table is chosen, many actuaries believe that it must be used for all contracts of that policy form.

Section 3.2 X Factor Requirements

11. *May the mortality experience used for the X factors be calculated using a combination of policy count/face amount experience?*

Section 3.7.1 of ASOP 40 states that, “[e]xposure based on amounts of insurance are most meaningful from the standpoint of financial impact on the company.” This statement arguably implies the use of face amount experience. However, this does not preclude looking at policy count experience or other methods for additional input into determining X factors. If the actuary has reason to believe that underlying experience should be the same by face amount as by number of claims (i.e., the larger policy sizes should have the same experience as smaller policies), then the claims experience by number of claims may provide a more credible estimate of the underlying experience. If the experience by amount is different than by number of claims, the actuary may wish to investigate the credibility of the amount-based claims and consider whether there are possible underlying explanations for different experience by policy size.

12. *How are X factors applied in the valuation of joint life contracts?*

The Model Regulation states that, “[f]or any duration in the first segment, X percent of the select mortality factors in the Appendix” can be used for the calculation of minimum reserves subject to certain criteria. Some actuaries believe that this wording implies that the most direct method is to apply the single life X factors to the single life 19-Year select factors for a 1980 CSO product, calculate the mortality for each individual life and then calculate the joint life deficiency reserve mortality using the single life rates. For a 1980 CSO product, a generally conservative approximation that also is used, is to:

- Start with the 19-Year select mortality rate for each life,
- Apply X factor type multiples (i.e., may be <20%, may decrease) to the individual life mortality rates,
- Calculate the joint life mortality rates,
- Calculate the implied joint life X factor by dividing the X factor joint life mortality by the 19-Year select joint life mortality,
- Apply the 20% and non-decreasing requirements to the implied X factors to produce the final X factors, and
- Calculate the deficiency reserve mortality using the final X factors applied to the 19-Year select joint life rates.

For a 2001 CSO product, an analogous method ordinarily would be used based on the X factors applicable to the 2001 Select and Ultimate CSO table.

13. *Under the Model Regulation, can X factors vary by valuation year – e.g., can the X factors for year 2001 be lower than the X factors in year 2000 for the same duration?*

Section 5(B)(3)(c) of the Model Regulation states that “[t]he X factors shall not decrease in successive policy years”. This is referring to the X factors used on the date of the valuation. Every time the X factor is re-determined, the Model Regulation requires this statement to be true. However, according to Section 5(B)(3)(g), “[t]he appointed actuary may decrease X at any valuation date as long as it continues to meet all the requirements.” Because of this provision, many actuaries feel that, if mortality has improved between valuation dates, the X factors at a certain duration can be lower from one year to the next and the X factors as of any valuation date can be independent of the X factors as of any prior valuation date.

14. *If the first segment and the valuation mortality table have the same terminal age, does the Model Regulation require the X factor applicable to the last age in the valuation mortality table to equal 1.0?*

There is no requirement in the Model Regulation that requires the X factor to increase to 1 by the last age in the valuation mortality table. The X factor criteria are expressed in the Model Regulation in terms of expected rather than valuation mortality.

15. *Section 5(B)(3)(d) of the Model Regulation refers to the “actuarial present value of future death benefits” in the calculation of X factors. Is this present value calculated only using the expected mortality in the first segment?*

According to Section 5 (B) (3) of the Model Regulation, this calculation is performed for the first segment only.

16. *Are lapses typically used in determining the “actuarial present value of future death benefits” in the calculation of X factors?*

No.

17. *What mortality is generally used for discounting in calculating the “actuarial present value of future death benefits” used to determine if the X factor criteria listed in Section 5 of the Model Regulation are satisfied?*

The Model Regulation suggests that this present value is to be calculated using the valuation mortality multiplied by the X factors. However, to avoid the recursive feature of this provision, many actuaries believe that the valuation mortality not multiplied by the X factors may be used in determining this present value.

18. *When testing the appropriateness of the X factors, are classes of business valued without the X factors (or an implied factor equal to 1) combined with classes of business valued with X factors?*

Several different sections of the Model Regulation and ASOP 40 address issues relating to aggregation. These different sections complement each other rather than create any conflict. As an example, Section 3.4 of ASOP 40 states that each X factor is to be appropriate for its own class while Section 3.2 requires an opinion which includes an aggregate test of all business if any X factor less than 100% is used by the company. (If no X factor less than 100% is used, the opinion required by Section 3.2 is not required – see also Q&A 21). Many actuaries believe that the requirement of an opinion covering all business is independent of the requirement that each X factor be appropriate for its own class.

In practice, the different requirements may be addressed in the following steps:

- Section 3.4 of ASOP 40, relating to the creation of X factors, states that contracts in each X factor class should generally have similar characteristics. Many actuaries believe that this requirement of similar characteristics does not allow the aggregation of all issue age/smoking classification/issue ages/other pricing variables of a policy form because there could be a wide variation in actual/expected mortality ratios. Therefore, while this section may allow for a substantial amount of aggregation based on the characteristics of the contracts, the actuary is usually prudent to be careful that the X factor classes chosen comply with the similar characteristics provision of Section 3.4. Many actuaries believe that, if a shift in the distribution of business would require a material change in the X factor, the classification used for that X factor would not be appropriate.
- After the X factor classes are determined, Section 3.5 of ASOP 40 requires that each X factor chosen be appropriate for its class and meets the requirements of the regulation itself. Therefore, this section allows no aggregation beyond the contracts included in a particular X factor class. The opinion required by Section 3.2 applies to all policies on specified plans of insurance for which the company has elected to apply *Model* select mortality factors for purposes of calculating deficiency reserves. For policies (on such specified plans) without X factors applied, the opinion would typically reflect implied X factors of 100%. Therefore, this section requires that all of a company's business (for products not excluded from the regulation) be aggregated for testing purposes, but with each class using its own X factor. Again, it should be noted, that many actuaries believe that if a shift in the distribution of business would require a material change in the X factor, the classification used for that X factor would not be appropriate.

19. *Section 4(B) of the Model Regulation states that R_t may be increased or decreased by 1%. It is not clear whether this means adding (or subtracting) 1% to R_t or multiplying R_t by 1.01 (0.99). Which method is in use?*

Many actuaries feel either method is a reasonable interpretation of the language in the Model Regulation and both methods are in use.

20. *Section 4(B) of the Model Regulation states that the valuation mortality rate for deficiency reserves is used to determine the length of segments. If the select mortality factors are used, does the actuary usually revert to the mortality table without select mortality factors after the first segment?*

It is possible that the approach described above can result in circular logic when determining the length of segments. Because of this, some actuaries (for purposes of determining segments only) use the select mortality factors for the entire length of the selection period.

Section 3.5 Selection of X Factors

21. *Are X factors used if the actuary elects to use the select mortality in calculating deficiency reserves?*

There is no requirement that X factors less than 100% be used just because the 19-year Select Factors from the Appendix of the Model Regulation are used in calculating deficiency reserves for a 1980 CSO product. This is also true for a product using the select and ultimate 2001 CSO table for deficiency reserves. If the company uses no X factors less than 100%, there is no additional testing or certification required by this regulation.

22. *If the first segment is greater than 19 years, does the Model Regulation permit the X factor to be applied to the 100% factor contained in the last column of the select mortality factors contained in the Appendix of the Model Regulation?*

The Model Regulation does not prohibit the X factor from being used for the entire length of the first segment. Therefore, some actuaries have indicated that, for years 20 and later, they plan to use a select factor of 100% for 1980 CSO products. The same actuaries believe that the X factor may be applied to all the select and ultimate rates of the 2001 CSO table of the first segment of the product.

23. *How does the actuary determine the X factors if there is no credible company or industry experience?*

Section 3.5.2 of ASOP 40 states that “reasonable and appropriate” methods are to be used. Therefore, the actuary uses judgment in determining what experience is to be used for testing purposes. The appropriate answer may vary from situation to situation depending on the unique circumstances that exist. In these cases, many actuaries carefully monitor emerging experience as it becomes available.

24. *If the appointed actuary desires to add an explicit margin for conservatism in X factors, how is this accomplished?*

Many actuaries believe that any such explicit margin should be noted in the Opinion. As for adding such a margin, it appears that any method and amount may be used as long as the resulting X factors comply with all requirements of the Model Regulation.

Section 3.5.1 Relevant Company Experience

25. *Is experience accumulated for several years and used when evaluating the appropriateness of the X factors?*

Section 3.5.1 of ASOP 40 states that, "[c]onsideration should be given to the length of the observation period, recognizing the tradeoff between having insufficient data if the period is too short and having data no longer relevant if the period is too long." Therefore, the actuary uses judgment in determining what experience is to be used for testing purposes. The appropriate answer may vary from situation to situation depending on the unique circumstances that exist.

26. Is the periodic assessment of anticipated mortality to be performed on a calendar year or policy year basis?

Most actuaries believe that either basis may be used. However, regardless of which basis is used, many actuaries would expect each successive study to include all experience from the end of the last study performed. This expectation ensures that potentially unfavorable experience is not excluded by a change in the method of how the study is performed. To the extent possible, actuaries typically use a consistent method from year to year. Any material change in the methodology is disclosed and justified as stated in ASOP 40.

27. The periodic assessment of anticipated mortality is to be performed annually. Is the assessment performed with an end date of December 31 or are other end dates also in use?

Many actuaries believe that the mortality study may use any reasonable period that ends in the current calendar year. While such a study would normally cover a 12-month exposure period, this is not a requirement. However, many actuaries believe that the intent is that the annual study will normally cover the same period each year and should be used consistently from year to year. Any material change from one year to the next in the time period used or other change in methodology is disclosed and justified in the memorandum as provided in ASOP 40. An example of such a change in methodology that is disclosed and justified is the length of the exposure period, such as going from a 3-year to a 5-year rolling period. For a new policy form, the actuary generally states what length of exposure period for mortality experience will be used and how new experience will be brought into the calculation as it becomes available.

28. Should paid or incurred claims be used in mortality studies used to justify X factors? Should a provision for IBNR be included in actual claims? At what level?

The answers to these questions depend upon when the mortality study is being performed. If the study is being performed immediately after the end of the observation period, many actuaries include IBNR. However, if the study is being performed at a date sufficiently past the period of observation, the inclusion of IBNR may not be necessary. The actuary exercises professional judgment in selecting a level of IBNR used for X factor determination that is appropriate for the class of business being reviewed. The actuary may also choose to include pending claims in a mortality study used for justifying X factors.

29. *What percentile of the aggregate claims standard distribution is used to evaluate emerging mortality experience v. expected?*

The Model Regulation does not specify an absolute test to be used for such an evaluation. Therefore, many actuaries believe there is no safe-harbor answer to the question and that the actuary therefore may need to justify whatever approach is taken. Some actuaries have found papers written by representatives of the Illinois Insurance Department and Lincoln Re to be useful in the evaluation of this question. These papers are available at the following web addresses: <http://library.soa.org/library/sectionnews/finrptng/FRN9905.pdf> (article begins on page 16), http://www.actuary.org/pdf/external/panjer_spencer.pdf, and <http://library.soa.org/library/tsa/1980-89/TSA80V3215.pdf>.

It should be noted that even if such an aggregate claims test is failed, the X factors may not need to be revised if, in the actuary's judgment, they are still appropriate.

Section 3.7 Adjustments to X Factors

30. *Are margins for adverse deviation incorporated into the process of setting and evaluating X factors? If so, how much is typical?*

While the Model Regulation does not require that margins be used for setting or evaluating X factors, an actuary may use margins if desired. There appear to be two major sources of adverse deviation that usually cause an actuary to add margins. First, there will be situations such as the addition of a new underwriting class for which there is little experience to use in setting the anticipated mortality. Second, a company's experience is based on a finite number of policies, so adverse deviation due to fluctuation may be expected to occur. Some actuaries have indicated that they may use margins to help minimize the risk of having to increase the X factors at some later valuation date.

31. *How does one decide whether or not to revise X factors (especially if company experience is not considered credible)?*

Section 3.5.2 of ASOP 40 states that "reasonable and appropriate" methods are to be used. Therefore, the actuary uses judgment in determining what experience is to be used for testing purposes. The appropriate answer may vary from situation to situation depending on the unique circumstances that exist. Typically, actuaries will closely monitor the emerging experience in these cases. Also, the actuary generally uses a consistent definition of credible experience when testing the X factor for different products. An example of consistency would be the continued use of a 3-year mortality study even if the use of a 5-year study might result in an X factor not having to be revised.

32. *Are changes in reserves due to X factor revisions reflected in the Gain from Operations or the Surplus accounts?*

The Model Regulation does not address the accounting treatment of a change in reserves due to revision in X factors. Therefore, many actuaries believe that a company has the option of deciding how any such change is reflected in its statutory statement. While there is no requirement that the treatment be the same, the actuary may want to review how his or her company would reflect a change in reserve due to Asset Adequacy Analysis.

33. *May an X factor be reduced, which may cause a release of reserves, without Insurance Department approval?*

The actuary is advised to contact the Insurance Department in his or her state of domicile for a definitive answer. However, some actuaries believe the answer to this question is yes.

Section 3.8.1 Basis of Exposure

34. *If exposures are measured by units of in-force business instead of covered lives, how is the standard deviation of total decrements usually calculated?*

The standard deviation of the total face amount of claims is fairly easy to calculate. It is the square root of the sum of the policy variances, where the variance of each policy is equal to (amount squared)*q*(1-q). The more difficult issue with regard to analyzing experience by units is determining the distribution pattern, (i.e., Can the standard deviation be used in combination with a normal (or binomial) distribution to easily determine the probability distribution of claims?).

Section 3.8 of ASOP 40 states that “although other measures of exposure such as number of lives can be useful in analyzing experience, exposures based on amounts or units of insurance are most meaningful from the standpoint of financial impact on the company.” When measuring exposures in amounts or units of insurance, the standard deviation of total decrements may be calculated from the company’s aggregate distribution of claims. Several methods may be employed to approximate or exactly determine the aggregate distribution of claims, including, but not limited to:

1) Monte Carlo Studies. This is the most common method used by actuaries to evaluate volatility in their aggregate claims distribution. Application of this method could involve the generation of a pseudo-random number (between 0 and 1) for each life in a company’s in-force file. If this number is less than the probability of death for that life, then that individual dies and the amount in-force is reported as a claim. Otherwise, the individual lives. Thousands of trials are usually run in order to approximate the actual aggregate distribution of claims. Once enough trials have been run, a sample mean, variance, and standard

deviation are calculated from the observed aggregate distribution of claims. How many trials are usually necessary to suitably approximate the actual aggregate distribution of claims? Many actuaries believe that as few as 1,000 or as many as 10,000 or more trials may be necessary. See Q&A 35 for additional information on this issue.

2) Convolutions. This method calculates the various convolutions of the distribution of claim amounts given that a certain number of claims occur. This method produces a complete description of the aggregate distribution of claims. For anything exceeding even a minimal number of policies in force, though, this method often results in complex and time-consuming calculations. For more information on convolutions, please refer to pages 35 and 369 of the Society of Actuaries textbook “Actuarial Mathematics,” Second Edition (1997), by Newton Bowers (et al.).

3) Recursive Definition. Harry Panjer derives a recursive method for generating the aggregate distribution of claims in his article, “The Aggregate Claims Distribution and Stop-Loss Reinsurance,” published in the *Transactions of the Society of Actuaries*, Volume XXXII, 1980, pages 523-545. Like the convolution method, the Panjer method also provides a complete description of the aggregate distribution of claims, but with far fewer calculations. The actuary may decide that a cap on the maximum claim amount is necessary to limit distortions produced by very large, individual claims.

Variability from expected mortality typically would be greater for the same group of policies when measured in units in-force rather than in number of lives, resulting in wider confidence intervals when using a base of units in-force. Expected mortality derived from an aggregate distribution of claims based on a number of lives could easily overstate mortality in all but the most simple of cases. This effect is a by-product of the differing levels of testing and review during the underwriting process as applied to policies with successively larger amounts of insurance applied for. Actuaries usually exercise care when reviewing mortality studies based on units of insurance in-force, as the presence or absence of a few large amount claims may produce material distortions in mortality experience versus the experience indicated by mortality studies based on the number of policies in force.

35. Are Monte Carlo studies based on units of exposure other than lives or policy counts feasible?

Section 3.8 of ASOP 40 (Basis of Exposure) states that the appointed actuary should “[a]nalyze the level and trend of actual mortality experience primarily using exposures based on amounts or units of insurance.” A Monte Carlo study based on amount of insurance in-force is generally feasible, and could be constructed as follows:

Consider a block of term life policies comprised of 10,000 lives in-force as of 12/31. Nine thousand of the policies have an average size of \$250,000 (band 1) and the remaining policies have an average size of \$1,000,000 (band 2). The policies issued in band 1 were underwritten using the company's normal paramedical underwriting guidelines. The expected annual mortality for this band over the past 12 months, across all issue ages, is 20 deaths per 1,000 lives in-force. The policies issued in band 2 were underwritten using the company's normal medical underwriting guidelines. The expected mortality for this band over the past 12 months, across all issue ages, is 10 deaths per 1,000 lives in-force. In this example, a Monte Carlo trial would consist of rolling a 100-sided die 10,000 times, once for each policy in force at 12/31. For a given roll of the die:

- If the policy being evaluated fell into band 1 and the roll of the die produced a "1" or a "2" then the policy is considered a claim for \$250,000.
- If the policy being evaluated fell into band 2 and the roll of the die produced a "1" then the policy is considered a claim for \$1,000,000.

The number of claims and dollar amount of claims is accumulated for each trial. Results for all trials typically would then be used to construct a probability density function for the simulated distribution of aggregate claims.

36. How many trials are typically used when applying the Monte Carlo method?

The number of required trials generally would vary with the experience results, the rejection criteria and the preliminary results from running a small number of trials. The number of trials necessary to produce useful results is often not as large as some may fear. Usually, the actuary is not trying to get an accurate picture of the 99.99% probability of claims when testing X factors. Consider the results of a Monte Carlo trial as follows. The actuary runs approximately 1000 trials with an expected mortality equal to roughly 50% of 1975-80. The insurer's actual experience last year was 65%. After 1000 trials, the actuary observes that 100 trials have mortality greater than 65%. Because 100 is greater than 35, the actuary can use the normal distribution and be about 95% confident (two standard deviations) that the number of trials greater than 65% is between 80 and 120. So, if the underlying mortality were 50%, there was only an 8-12% probability that actual experience would have been as high as 65%. This may be all the information the actuary needs. Running more Monte Carlo trials to narrow that 8-12% range may not, in the actuary's judgment, be worth the effort.

37. The use of any statistical methodology requires the use of data, even if limited. What methods are typically used for new business?

For new products, many actuaries may start with relevant company mortality experience and trends from products with similar risk characteristics. This usually includes products that use the same or similar underwriting classes. The appointed actuary generally takes into account the anticipated impact of differences in product characteristics or underwriting criteria between the

new product and the products underlying the experience. If there are no company products with relevant and credible experience, then the appointed actuary usually relies on experience and trends from other companies (including reinsurers), or from other sources. The appointed actuary uses professional judgment in order to derive anticipated mortality from these sources. The actuary usually finds it prudent for the anticipated mortality chosen for X factor classes for the new product to be supportable relative to the anticipated mortality chosen for other X factor classes.

Section 3.7.2 Reinsurance

38. *Is the X factor an assuming reinsurer uses sometimes different than that used by the ceding company?*

Many actuaries believe there is no requirement in the Model Regulation or ASOP 40 that requires the ceding company and reinsurer to use the same X factors. In fact, a ceding company uses an X factor that is appropriate for the business it cedes while a reinsurer may combine similar business from several ceding companies to determine an X factor class. In such a case, it is likely that the X factor used by the reinsurer will be different from the related X factor used by any of the ceding companies.

39. *Does the Model Regulation require the reserve credit taken by the ceding company to be the same as reserves held by the assuming reinsurer?*

According to section 6(E)(6) of the Model Regulation, if the assuming company chooses to use the optional exemption for Yearly Renewable Term Insurance, the ceding company's reinsurance reserve credit is limited to the amount of the reserve held by the assuming company on the affected policies. Also, if any regulation or the contract between the ceding company and reinsurer requires mirror reserving, this requirement would govern the level of reserve credit. If the above does not apply, the reserves held by the ceding and assuming company typically do not have to be the same.

40. *If the assuming company chooses the optional exemption for Yearly Renewable Term reinsurance, what, under the Model Regulation, is the appropriate reserve credit for the ceding company?*

The Model Regulation provides that the ceding company may take credit for no more than the amount of reserves established by the assuming company. The actuary may wish to consider requiring that this provision be in a reinsurance agreement to facilitate the exchange of reserve information between the assuming and the ceding company.

41. *Is the X factor a company uses to calculate reserves for direct business sometimes different*

from the X factor used for reinsurance ceded business on the ceding company's books?

It is possible for the X factor for direct business to be different from the X factor for ceded business in the same X factor class, but this typically occurs only if there is a material difference in the anticipated mortality. The mere fact that business is reinsured is not usually sufficient justification for different X factors. If the risk characteristics of the ceded business are different, as may be the case for facultative or excess share reinsurance, then it may be acceptable to establish a separate X factor class for this ceded business. Many actuaries believe that it would not be appropriate to use different X factors for quota share business, where a set percentage of every policy is reinsured. The appointed actuary is required by the Model Regulation to opine on the appropriateness of all of the X factors, including both direct and ceded business. It is important to remember that an X factor is to be appropriate for the entire class of direct business and that the presence of reinsurance alone is not to be used as a justification for lowering the X factor on retained business. However, the actuary may wish to consider whether the retained business would, in fact, require a different X factor than for the entire block of business.

42. If business is to be reinsured under a new coinsurance agreement, is experience for the period prior to the effective date of the agreement usually provided to the reinsurer for the purpose of setting the X factor?

Although reinsurers often request such experience, and it is commonly given (if available), the Model Regulation does not require or prohibit such sharing. The actuary may consider reviewing the reinsurance agreement in question to determine what it requires in terms of sharing experience.

43. Is the existence of reinsurance and/or the level of reinsurance costs and mortality charges sometimes used to derive the choice of an X factor?

Generally speaking, the existence or cost of reinsurance should not be used in deriving the choice of an X factor. However, many actuaries believe that it is appropriate to exclude catastrophe/stop-loss or excess amount reinsurance from the testing required by this regulation. For other types of reinsurance, the actuary may consider consulting with the reinsurer(s) on business that is reinsured, especially for new lines of business or new underwriting classes where the reinsurer may have more credible experience than the direct writer. However, the Model Regulation requires that the experience of the direct writer (both anticipated and actual) be used rather than relying totally upon the reinsurer. It is important to remember that an X factor is to be appropriate for the entire class of direct business and that the presence of reinsurance alone is not to be used as a justification for lowering the X factor on retained business. However, the actuary may wish to consider whether the retained business would, in fact, require a different X factor than for the entire block of business.

General Issues

44. Are negative terminal reserve (unitary and segmented) usually floored at zero before calculating

mean reserve factors?

Many actuaries believe that a reasonable interpretation of CRVM is that terminal reserves are set at a minimum of zero before being used in a mean reserve calculation. However, the Model Regulation does not address this provision of CRVM so the actuary may wish to review material directly related to this issue in deciding how to interpret CRVM.

Many actuaries believe that Section 6(C) of the Model Regulation, which prescribes an absolute minimum reserve for comparison to the calculated mean reserve, does constitute an addition to CRVM.

45. *Are mean tax reserves usually floored at $\frac{1}{2} c_x$?*

Many actuaries believe that the tax reserve calculation takes into account the minimum reserve defined by Section 6(C) of the regulation ($=\frac{1}{2} c_x$), and is part of the basic statutory reserve for tax reserve comparison purposes. The $\frac{1}{2} c_x$ used in this calculation is based on the tax assumption for the c_x used in defining the FPR (federally prescribed reserve), which is based on the 1980 CSO or 2001 CSO without select factors, but not larger than the statutory reserve held for that contract. The statutory minimum requirement allows for the use of select factors, and if the statutory reserve is lower than the FPR the statutory cap will limit the tax reserve

46. *In calculating segmented tax reserves, are statutory “segment” results used, or are the segment periods usually recalculated using tax valuation mortality rates?*

The tax reserve calculations will use the same segments as defined for statutory reserves.

47. *If a policy guarantees a level premium for a period of years followed by a series of YRT premiums, is the YRT exemption of Section 6(F) of the Model Regulation used even if the guaranteed premiums create a segment that extends into the YRT period? It appears this situation could develop if the slope of the guaranteed YRT premiums is lower than the slope of the underlying mortality.*

Many actuaries believe that it is preferable to calculate reserves according to the segments that develop according to the Model Regulation without regard to whether the underlying guaranteed premiums at a particular time are level or YRT in nature. This implies that humpback reserves may be preferable for a segment, even if that segment extends beyond the end of a level premium period into a YRT premium schedule.

48. *Are separate X factors typically used for each substandard class for use in developing deficiency reserves as is done for standard-rated policies?*

In practice most companies do not hold deficiency reserves on the substandard portion of any coverage. Instead, most companies hold (1) standard reserves, plus (2) substandard extra reserves, plus (3) deficiency reserves based only on the standard premium.

Many actuaries believe that regulation XXX did not change the intent of the Standard Valuation Law with regard to reserving for substandard policies. Thus, it is anticipated that most companies will not establish a deficiency reserve for a substandard policy that is larger than for a comparable standard policy.

49. *Can the results of tests that utilize the 1980 CSO Mortality Table be combined with those tests that utilize the 2001 CSO Mortality Table?*

No, the tests based on two different tables may not be combined unless the combination is explicitly required by regulation or necessary to be in compliance with relevant Actuarial Standards of Practice. This is clearly stated in the 2001 CSO Mortality Table regulation in Section 6A(4).

50. *The Model Regulation requires the use of the select mortality factors from the Appendix. Can these select mortality factors be used for a 2001 CSO product?*

No. These select mortality factors are only for a 1980 CSO product. The 2001 CSO select mortality rates are used for a 2001 CSO product as stated in Section 6A(4) of the 2001 CSO Model Regulation. Similarly, the select rates should be used when 2001 CSO Preferred Class Structure Tables are used as stated in Section 6A(4) of the Model Regulation Permitting the Recognition of Preferred Mortality Tables.

51. *Should the minimum reserves be calculated using the same type of reserve function, i.e., either curtate, semi-continuous, fully or discounted continuous, as used for basic reserves?*

Many actuaries consider it desirable that a consistent basis be applied. Potential tax reserve issues could be raised because deficiency reserves are not tax deductible. It is prudent to check with your tax expert for further guidance on this issue.

52. *If a company elects to use the 2001 CSO for basic and deficiency reserves, could the select mortality rates be used for the reserve floor, i.e., the tabular cost of insurance?*

No. Based on Appendix A-830 of Codification, paragraph 23, Minimum Value: "Effective January 1, 2004, the valuation mortality table used in determining the tabular cost of insurance shall be the ultimate rates in the 2001 CSO Mortality Table."

53. This refers to Section 8C of Actuarial Guideline XXXVIII. *First Step: What premium pattern should be assumed for the minimum gross premiums determined at issue that will satisfy the secondary guarantee requirement?*

The minimum premiums are typically calculated for each policy year. For a shadow account design this would be the minimum premium required to carry the shadow account from one anniversary to the next.

54. This refers to Section 8C of Actuarial Guideline XXXVIII. *Second Step: How are the lapse rates used in calculating the reserves in Sections 7B and 7C of the Model?*

The lapse rates are ordinarily used as an additional decrement in calculating the present values of future guaranteed benefits, future net premiums, and the net premiums themselves.

(Note that some states will not allow the use of lapses when determining reserves. State laws supersede Actuarial Guidelines.)

55. This refers to Section 8C of Actuarial Guideline XXXVIII. *Fourth Step: How is the minimum amount of shadow account required to fully fund the guarantee determined?*

This usually would be the shadow account value that, if in existence on the valuation date, would require the payment of no additional premiums to provide coverage for the remainder of the secondary guarantee period. Note that no assumption of minimum funding prior to the valuation date is assumed when performing this calculation.

56. This refers to Section 8C of Actuarial Guideline XXXVIII. *Fifth Step: How are the lapse rates used in calculating the net single premium on the valuation date?*

See Question 54 above.

57. This refers to Section 8C of Actuarial Guideline XXXVIII. *Eighth Step: For what situations is the adjustment to the surrender charge needed?*

The surrender charge adjustment is needed only when the secondary guarantee period is less than the whole of life. For policies in which the secondary guarantee period is the whole of life, no adjustment need be made even if the contract is currently being funded for a shorter period. The determination is made based on the maximum period that can be guaranteed under the contract.