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May 29, 2020

Mr. Philip Barlow
Chair, Life Risk Based Capital (E) Working Group
National Association of Insurance Commissioners (NAIC)

Via email: Dave Fleming (dfleming@naic.org)

Re: Longevity Risk Charge

Dear Philip,

On behalf of the C-2 Longevity Risk Work Group of the American Academy of Actuaries,¹ I am providing suggested edits to the risk-based capital (RBC) forms and instructions for C-2b longevity risk to address some questions and ambiguities that have come to our attention. I am also providing additional information on the impact of adding a longevity risk charge together with correlation would have on Life Risk-Based Capital (LRBC) results. There was discussion on the February 14, 2020, LRBC call on the potential for C-2 to decrease with correlation and the ability for a ‘guardrail’ factor to prevent such decrease. We want to ensure the impact of correlation is clear when the Life RBC Working Group decides on a correlation factor to implement.

Included with this letter are several updated documents which include redlined suggested changes that address several areas where we believe additional clarification is warranted to promote uniform application across companies:

- Revised draft of RBC instructions C-2b longevity risk with clarification of scope.
- Revised form LRtbd for C-2b longevity risk including adjustment for modified coinsurance (MODCO) reinsurance.
- Suggested forms LRtbdCeded and LRtbdAssumed to adjust the C-2b amount to reflect reserves ceded and/or assumed via MODCO.
- Revised draft of RBC instructions for MODCO reinsurance arrangements.

There were three clarifications to Scope in the instructions for C-2b longevity risk:

1. Clarification that the entire reserve for contracts with both certain and life contingent payments are in scope for C-2. Some companies may have interpreted the prior instructions to allow for exclusion of the portion of the reserve associated with the non-

¹ The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

life contingent payments. The recommended factors [we provided](#) at the 2019 Spring Meeting were calibrated to apply to the entire reserve for these contracts, and field study results confirmed that this approach was reasonable across different product types.

2. Specific mention that variable immediate annuities under VM-21 are in scope.
3. Specific exclusion of variable deferred annuities under VM-21, including those where the contract account value has reached zero but a lifetime benefit is still payable by the insurer. Deferred variable annuity benefits were excluded from scope for this phase of work on longevity risk. The currently exposed factors could conceptually be applied to the reserves for living benefit policies whose account values have reached zero. In practice it may be difficult to allocate VM-21 reserves for policies with zero account value. We continue to recommend future work to determine a method for longevity C-2 that can be applied consistently for all variable annuity living benefits.

The suggested edits in the documents accompanying this letter provide an adjustment to align the C-2b longevity risk with the assuming company rather than the ceding company under modified coinsurance (MODCO). This adjustment is analogous to what is done in LR045, LR046, LR047, and LR048 for C-1 risk under MODCO or funds withheld reinsurance. For C-2b longevity risk, which is calculated as a factor applied to reserves, this adjustment is only needed for MODCO where reserves are retained by the direct writer or ceding company. Reserves under coinsurance or funds withheld reinsurance are reported by the assuming company and longevity risk capital would apply to the reinsurer without further adjustment.

None of these suggested edits address the circumstance where only longevity risk is reinsured as this type of reinsurance has been specifically excluded from C-2b pending further regulator discussion.

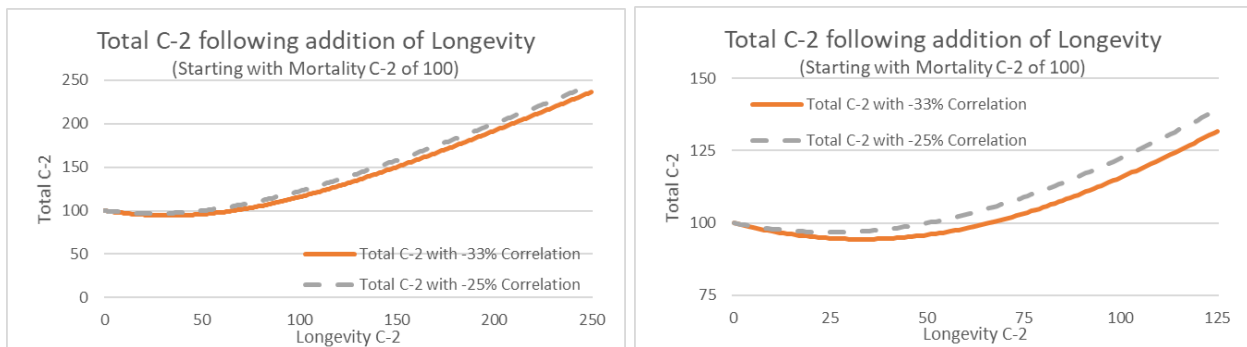
Overall, the introduction to LRBC of longevity risk correlated with mortality risk will identify companies with concentrated exposure to longevity risk, while appropriately having little impact on companies with low or balanced levels of longevity risk.

A negative correlation factor between mortality and longevity risk will have the potential to result in a small decrease to C-2 for some companies. The following illustrative graphs both show how C-2 would change for a company with \$100 of C-2 mortality risk following the addition of C-2 longevity risk at different amounts. The two graphs show the same underlying information but with different scales which highlight different observations:

1. The first graph shows that total C-2 changes vary little when longevity risk is less than mortality risk but increases materially once longevity is the larger risk.
 - This appropriately results in little change to RBC for companies with low or balanced exposure to longevity risk.
 - It is also successful in identifying and increasing RBC for companies with concentrated exposure to longevity risk.

2. The second graph is zoomed in on the left portion of the first graph and more clearly shows the decrease to total C-2 that would result when longevity exposure is low relative to mortality.
 - For C-2 Longevity amounts less than \$66 the resulting total C-2 is less than \$100.
 - The lowest possible resulting C-2 is \$94.4, representing a 5.6% decrease. (With a -25% correlation assumption, the lowest possible result is \$96.8, or a 3.2% decrease.)
 - Total C-2 increases for C-2 Longevity amounts greater than \$66. (Total C-2 increases for C-2 Longevity amounts greater than \$50 under the -25% correlation assumption.)

The results and impacts to actual companies are unknown; it is unclear what proportion of companies will fall in the left portion of the graph with minimal impact to RBC vs. the right portion where total C-2 would increase with the introduction of longevity C-2. A future impact study would provide a better understanding of how the introduction of C-2 would affect actual companies across the industry but would not change our recommendation for the correlation factor that appropriately reflects the relationship between longevity and mortality risk.



It may also be useful to recall examples that have previously been shared with Life RBC Working Group illustrating hypothetical company impacts of adding Longevity C-2. These examples start with the 2017 aggregate Life RBC Working Group results and show the hypothetical impact of adding Longevity C-2 for a company with Low, Balanced, and Concentrated exposure to longevity risk.

- The low longevity exposure example results in a two-percentage point increase (from 517% to 519%) to the hypothetical company CAL RBC ratio under the proposed -33% correlation factor.
- The balanced longevity exposure example results in a 7% decrease to the hypothetical company CAL RBC ratio.
- The concentrated longevity exposure example results in a 105% decrease to the hypothetical company CAL RBC ratio.

	<u>Baseline</u>	<u>Concentrated Longevity</u>			<u>Balanced Longevity</u>			<u>Low Longevity Exposure</u>		
<i>C2a Mortality/Other Insurance Risk</i>		25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
<i>C2b Longevity Insurance Risk</i>	n/a	75.4	75.4	75.4	25.1	25.1	25.1	5.0	5.0	5.0
<i>Longevity - Mortality Correlation</i>	n/a	-25%	-33%	-50%	-25%	-33%	-50%	-25%	-33%	-50%
Calculated CAL RBC	101.8	129.3	127.8	124.4	104.0	103.3	101.8	101.6	101.4	101.1
Total Adjusted Capital	526.6	526.6	526.6	526.6	526.6	526.6	526.6	526.6	526.6	526.6
Calculated CAL RBC Ratio	517%	407%	412%	423%	506%	510%	517%	518%	519%	521%
<i>Change in RBC Ratio vs Baseline</i>	-	-110%	-105%	-94%	-11%	-7%	0%	1%	2%	4%

We believe these examples demonstrate that the introduction of the longevity risk charge would be effective in identifying companies with concentrated exposure to longevity risk, while having appropriately little impact on companies with limited or balanced exposure to longevity risk. While a guardrail factor could be implemented as a floor to total C-2, this floor would have little impact on RBC results as these examples illustrate. We would be glad to further discuss or provide additional analysis to assist the Life RBC Working Group in this matter.

Also note that the analysis used to develop both capital and correlation factors was long term in nature and is not based on the actual or projected impact of recent longevity or mortality events.

Should you have any questions or comments regarding this letter, please contact Ian Trepanier, life policy analyst at the Academy (trepanier@actuary.org).

Sincerely,

Paul Navratil, MAAA, FSA
Chairperson, C-2 Longevity Risk Work Group
American Academy of Actuaries

LONGEVITY RISK

LRtbd

Basis of Factors

The factors chosen represent surplus needed to provide for claims in excess of reserves resulting from increased policyholder longevity calibrated to a 95th percentile level. For the purpose of this calibration aggregate reserves were assumed to provide for an 85th percentile outcome.

Longevity risk was considered over the entire lifetime of the policies since these annuity policies are generally not subject to repricing. Calibration of longevity risk considered both trend risk based on uncertainty in future population mortality improvements, as well as level or volatility risk which derives from misestimation of current population mortality rates or random fluctuations. Trend risk applies equally to all populations whereas level and volatility risk factors decrease with larger portfolios consistent with the law of large numbers.

Statutory reserve was chosen as the exposure base as a consistent measure of the economic exposure to increased longevity. Factors were also scaled by reserve level since number of insured policyholders is a less accessible measure of company specific volatility risk. Factors provided are pre-tax and were developed assuming a 21% tax adjustment would be subsequently applied.

Specific Instructions for Application of the Formula

Annual statement reference is for the total ~~life-contingent~~ reserve for the products in scope. The scope includes annuity products with life contingent payments where benefits are to be distributed in the form of an annuity. ~~The entire reserve amount for contracts in scope that include any life contingent payments are in scope. For example, under a certain-and-life style annuity, the entire reserve for both the certain payments and life contingent payments are in scope. Variable immediate annuity reserves under VM-21 are also in scope where there are life contingent payments.~~

Included in scope are:

- Single Premium Immediate Annuities (SPIA) and other payout annuities in pay status
- Deferred ~~Income Payout~~ Annuities which will enter annuity pay status in the future ~~upon annuitization~~
- Structured Settlements for annuitants with any life contingent benefits
- Group Annuities, such as those associated with pension liabilities with both immediate and deferred benefits

~~Scope does not include annuity products that are not life contingent, or deferred annuity products where the policyholder has a right but not an obligation to annuitize. A certain-and-life style annuity, where only certain payments remain (such as following the death of the annuitant), is out of scope. Variable deferred annuity contract reserves under VM-21 are out of scope, including reserves valued under VM-21 for any contracts where policyholder account value has reached zero, but a lifetime benefit may still be payable by the insurer. Line (3) for General Account Life Contingent Miscellaneous reserves is included in the event there are any reserves for products in scope reported on Exhibit 5 line 0799999; it is not meant to include cash flow testing reserves reported on this line.~~

~~{additional instructions would be required if Longevity Reinsurance product remains in scope—placeholder pending decision on scope}~~

The total reserve exposure is then further broken down by size as in a tax table. This breakdown will not appear on the RBC filing software or on the printed copy, as the application of factors to reserves is completed automatically. The calculation is as follows:

<u>Line (59)</u>	<u>Life Contingent Annuity Reserves</u>	(1) <u>Statement Value</u>	<u>Factor</u>	(2) <u>RBC Requirement</u>
	First 250 Million	_____	X 0.0171 =	_____
	Next 250 Million	_____	X 0.0108 =	_____
	Next 500 Million	_____	X 0.0095 =	_____

Over 1,000 Million

X 0.0089 =

Total Life Contingent Annuity Reserves

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Longevity Risk

	<u>Annual Statement Source</u>	(1) <u>Statement Value</u>	<u>Factor</u>	(2) <u>RBC Requirement</u>
<u>Life Contingent Annuity Reserves</u>				
(1) General Account Life Contingent Annuity Reserves	Exhibit 5 column 2 row 0299999, in part ‡			
(2) General Account Life Contingent Supplemental Contract Reserves	Exhibit 5 column 2 row 0399999, in part ‡			
(3) General Account Life Contingent Miscellaneous Reserves	Exhibit 5 column 2 row 0799999, in part ‡			
(4) Separate Account (SA) Life Contingent Annuity Reserves	S/A Exhibit 3 column 2 row 0299999, in part ‡			
(5) General Account Reserves Assumed via MODCO Reinsurance	LRtbdAssumed column 4 row 9999999			
(6) Separate Account Reserves Assumed via MODCO Reinsurance	LRtbdAssumed column 5 row 9999999			
(7) General Account Reserves Ceded via MODCO Reinsurance	LRtbdCeded column 4 row 9999999			
(8) Separate Account Reserves Ceded via MODCO Reinsurance	LRtbdCeded column 5 row 9999999			
(9) Total Life Contingent Annuity Reserves	Lines (1) + (2) + (3) + (4) + (5) + (6) - (7) - (8)		X ‡	=

† The tiered calculation is illustrated in the Longevity Risk section of the risk-based capital instructions.

‡ Include only the portion of reserves for products in scope per the instructions

Denotes items that must be manually entered on the filing software.

MODCO REINSURANCE AGREEMENTS
Reinsurance Ceded - Longevity C-2b Reserves

	(1) NAIC Company Code	(2) Federal or Alien ID Number	(3) Reinsurer	(4) General Account C-2b Reserves Held by Company for Business Ceded	(5) Separate Account C-2b Reserves Held by Company for Business Ceded
(000001)					
(000002)					
(000003)					
(000004)					
(000005)					
(000006)					
(000007)					
(000008)					
(000009)					
(000010)					
(000011)					
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(000022)					
(000023)					
(000024)					
(000025)					
(000026)					
(000027)					
(000028)					
(000029)					
(000030)					

(999999)	XXX	XXX	Total		
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Denotes items that must be manually entered on the filing software.

MODCO REINSURANCE AGREEMENTS

Reinsurance Assumed- Longevity C-2b Reserves

	(1) NAIC Company Code	(2) Federal or Alien ID Number	(3) Ceding Company	(4) General Account C-2b Reserves Held by Direct Writer or Ceding Company for Business Assumed	(5) Separate Account C-2b Reserves Held by Direct Writer or Ceding Company for Business Assumed
(0000001)					
(0000002)					
(0000003)					
(0000004)					
(0000005)					
(0000006)					
(0000007)					
(0000008)					
(0000009)					
(0000010)					
(0000011)					
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(0000027)					
(0000028)					
(0000029)					
(0000030)					

(9999999)	XXX	XXX	Total		
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Denotes items that must be manually entered on the filing software.

MODCO OR FUNDS WITHHELD REINSURANCE AGREEMENTS

LR045, LR046, LR047, ~~and~~ LR048, LRtbdCeded, and LRtbdAssumed

References to MODCO and funds withheld reinsurance agreements apply to all treaties in effect.

Basis of Factors

When the default risk in modified coinsurance (MODCO) and other reinsurance transactions with funds withheld is transferred, this transfer should be recognized by reducing the RBC for the ceding company and increasing it for the assuming company. In the event that the entire asset credit or variability in statement value risk associated with the assets supporting the business reinsured is not transferred to the assuming company for the entire duration of the reinsurance treaty, the RBC for the ceding company should not be reduced.

When the longevity risk in modified coinsurance (MODCO) is transferred, this transfer should be recognized by reducing the RBC for the ceding company and increasing it for the assuming company. The longevity risk adjustment is not required under funds withheld reinsurance as the RBC for longevity risk is assessed based on the reserves which are already reported by the assuming company. In the event that the entire longevity risk associated with the liability is not transferred to the assuming company for the entire duration of the reinsurance treaty, the RBC for the ceding company should not be reduced.

Assets

The total RBC related to assets (i.e., bonds, mortgages, unaffiliated preferred and common stock, separate accounts, real estate and other long-term assets) in MODCO or Funds Withheld reinsurance agreements, should be reduced (increased) by the amounts of RBC ceded (assumed). There is a separate line in each asset section to achieve this reduction (i.e., “Reduction in RBC for MODCO or Funds Withheld reinsurance ceded agreements”). The amount ceded is determined using the assets supporting the ceded liabilities as of Dec. 31. (In some instances, there may be assets in a trust that exceed the amount needed to support the liabilities; only the portion of assets used to support the ceded liabilities is used to determine the ceded RBC). The ceding company will need to supply the assuming company with sufficient information in order for the assuming company to determine the amount of RBC assumed. With the exception of the impact of the size factor, the amount of RBC ceded should be equal to the amount of RBC assumed. Put another way, there should be “mirror imaging” of RBC, except for the impact of the size factor. For MODCO or Funds Withheld reinsurance agreements, there will be no specific, line-by-line inventory of ceded assets and corresponding ceded RBC; however, ceding and assuming companies must keep detailed records and be prepared to produce those records upon request. The ceding company is required to supply the assuming company with sufficient information in order for the assuming company to determine the amount of RBC assumed.

A reinsurer that has not received such information shall calculate MODCO adjustments for reinsurance assumed as follows:

- If the reinsurer has received data for periods prior to the effective date of the RBC filing, a “MODCO liability ratio” will be developed by comparing the MODCO liabilities at the filing date to the MODCO liabilities as of the last date for which data were received. The required capital for MODCO assumed is the required capital as calculated based on these data multiplied by the “MODCO liability ratio.”
- If the reinsurer has never received data from the ceding company, a “MODCO liability ratio” will be developed by comparing the MODCO liabilities at the filing date to the reinsurer’s total invested assets (Page 2, Line 12 of the blue blank, or its equivalent). The required capital for MODCO assumed is the reinsurer’s required capital as calculated prior to MODCO ceded and assumed adjustments multiplied by the “MODCO liability ratio.”

Adjustments for MODCO or Funds Withheld reinsurance agreements should be based on pre-tax factors.

Size Factor

Companies with MODCO or Funds Withheld reinsurance agreements should adjust the company’s year-end size factors according to the way the bonds are handled in the treaties. The assuming company includes the bonds that support its share of the liabilities; the ceding company includes the bonds that support its share of the liabilities. No adjustment is made for bonds purchased subsequent to June 30 of the valuation year and that solely support ceded liabilities.

Mortgages

The amount of RBC for mortgages is based upon the ceding company's calculation for the mortgages, or portion of these mortgages, which support the ceded liabilities. Thus, the amount of RBC ceded is equal to the amount of RBC assumed.

Specific Instructions for Application of the Formula

MODCO OR FUNDS WITHHELD REINSURANCE AGREEMENTS

Reinsurance Ceded - Bonds C-1o
LR045

Column 4

Enter by reinsurer, the amount of C-1o RBC the insurance company has ceded that is attributable to bonds. The "total" should equal the total amount of the reduction in C-1o RBC shown on Line (19) of page LR002 Bonds.

MODCO OR FUNDS WITHHELD REINSURANCE AGREEMENTS

Reinsurance Assumed - Bonds C-1o
LR046

Column 4

Enter by ceding company, the amount of C-1o RBC the insurance company has assumed that is attributable to bonds. The "total" should equal the total amount of the increase in C-1o RBC shown on Line (20) of page LR002 Bonds.

MODCO OR FUNDS WITHHELD REINSURANCE AGREEMENTS

Reinsurance Ceded – All Other Assets C-0, C-1o And C-1cs
LR047

Column 4

Enter by reinsurer, the amount of C-0, C-1o And C-1cs RBC the company has ceded that is attributable to all assets except bonds. The "total" should equal the total amount of the reduction of C-0, C-1o And C-1cs RBC attributable to all assets except bonds for MODCO and funds withheld agreements.

MODCO OR FUNDS WITHHELD REINSURANCE AGREEMENTS

Reinsurance Assumed – All Other Assets C-0, C-1o And C-1cs
LR048

Column 4

Enter by ceding company, the amount of C-0, C-1o And C-1cs RBC the insurance company has assumed that is attributable to all assets except bonds. The "total" should equal the total amount of the increase in C-0, C-1o And C-1cs RBC attributable to all assets except bonds for MODCO and funds withheld agreements.

MODCO REINSURANCE AGREEMENTS

Reinsurance Ceded – Longevity C-2 Reserves
LRtbdCeded

Column 4

Enter by reinsurer, the amount of reserves in scope for C-2b longevity risk per LRtbd the insurance company holds for business ceded via MODCO reinsurance agreements.

MODCO REINSURANCE AGREEMENTS

Reinsurance Assumed – Longevity C-2 Reserves
LRtbdAssumed

Column 4
Enter by ceding company, the amount of reserves in scope for C-2b longevity risk per LRtbd the direct writer or ceding company holds for business assumed by the insurance company via MODCO reinsurance agreements.