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# PBA Corner

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The Joint American Academy of Actuaries Life Experience Committee and Society of Actuaries Preferred Mortality Oversight Group (Table Team) has finished work on the 2017 Commissioner's Standard Ordinary (CSO) Tables and the 2015 Valuation Basic Tables (VBT). All versions of these tables are available for download from [http://www.naic.org/committees\\_a\\_latf.htm](http://www.naic.org/committees_a_latf.htm). The application of these tables to reserve and nonforfeiture values is captured in a series of amendment proposal forms found on the same site, under the heading Exposure Drafts. This article summarizes the characteristics of the new tables, the impact of the new tables on life insurance reserves and the schedule for implementation. The impact summary is excerpted from the June 2015 research report jointly sponsored by the SOA and American Council of Life Insurers and titled "Report on 2014 VBT/2017 CSO Impact Study – Considerations for Life Insurance Products."<sup>1</sup>

## TABLE CHARACTERISTICS

As in prior table developments, the creation of a valuation mortality table starts with data submitted by industry, which pro-

vides the basis for the valuation basic table, or VBT. Below are listed overall characteristics of the 2015 VBT mortality tables.

- Industry experience used as the underlying basis for the VBT tables is experience data from the SOA's Individual Life Experience Committee 2002-2009 study. This study represents more robust data and materially more exposure than was the case for the 2008 VBT development. For example, \$30.7 trillion exposure by amount contributed by 51 companies for the 2015 VBT versus \$7.4 trillion exposure by amount contributed by 35 companies for the 2008 VBT.
- The smoking classification includes experience from the industry's move into a broader tobacco underwriting classification (here the labels "smoking" and "tobacco" are used interchangeably).
- The relative risk (RR) versions of the 2015 VBT include the same number of tables as for the 2008 VBT (10 for nonsmokers, four for smokers), but for nonsmokers, the numbering system has changed to reflect changes to risk class relativities. In concert with this, the underwriting criteria scoring tool has also been updated. Companies having mapped their risk classes to the 2008 VBT RR tables using the original tool should revisit and update the mapping. The 2015 VBT RR nonsmoker tables are: RR50, RR60, RR70, RR80, RR90, RR100, RR110, RR125, RR150, and RR175. The smoker tables are RR75, RR100, RR125, and RR150. The RR100 table is the primary table for that risk class.
- The 2015 VBT array of RR tables does not include a limited underwriting table. The SOA Table Team expects to develop a table specific to guaranteed issue, simplified issue or pre-need products.
- The omega rate per 1,000 is 500 at attained age 112. There is no omega age for the VBT tables.
- Composite, smoker-distinct, and preferred structure versions of the valuation table are available.
- Within the preferred structure there are three nonsmoker classes and two smoker classes.
- The select and ultimate form of the basic tables was created using a 25 year select period format. Select mortality rates are provided for issue ages 18 through 95; however, the length of the actual select period will vary by gender and issue age. At younger and older issue ages, the actual select mortality rates are for a period less than 25 years.
- Rates for juvenile issue ages (0-17) are found only in the composite tables (male and female).



**Table 1****2017 CSO Mean Reserve as Percent of 2001 CSO Mean Reserve**

Whole Life Product Overall Results

	t = 5	t = 10	t = 15	t = 20	t = 30	t = 40	t = 50
5-Class Ultimate	92%	93%	94%	95%	97%	98%	99%
2-Class Ultimate	90%	92%	93%	94%	96%	98%	99%
1-Class Ultimate	94%	95%	96%	97%	98%	99%	100%

**2017 CSO Reserve as Percent of 2001 CSO Reserve**

ULSG Product Overall Results

	t = 5	t = 10	t = 15	t = 20	t = 30	t = 40	t = 50
5-Class Ultimate	92%	90%	91%	91%	93%	94%	95%
2-Class Ultimate	89%	86%	87%	88%	90%	92%	92%
1-Class Ultimate	95%	93%	93%	94%	95%	97%	98%

- Each of the three available workbooks (composite, smoker-distinct, preferred structure) include the age nearest and age last mortality rates.

The VBT table is loaded for use as a statutory valuation table and presented to the regulators for consideration as a Commissioners Standard Ordinary valuation table, or CSO. In the case of the 2015 VBT, the Table Team improved the basic table to 2017 before applying loading, since 2017 is the year the table is first expected to apply to new life insurance issues. Below are listed overall characteristics of the 2017 CSO valuation mortality tables. Many of these are similar to the 2001 CSO valuation mortality tables.

- Composite (1-Class), smoker-distinct (2-Class), and preferred structure (5-Class) versions of the valuation table are available.
- Within the preferred structure there are three nonsmoker classes and two smoker classes.
- The select and ultimate form of the valuation table was created using a 25 year select period format. Select mortality rates are provided for issue ages 18 through 95; however, length of the actual select mortality rates will vary by gender and issue age. Any given issue age has at most 25 years of select mortality rates. At younger and older issue ages, the actual select rates are for a period less than 25 years.
- Rates for juvenile issue ages (0-17) are found only in the composite tables (male and female).
- The ultimate mortality rates per 1,000 grade to 1,000 at attained age 120, making the omega age of the valuation tables 121.

- Each of the three available workbooks (composite, smoker-distinct, preferred structure) include the age nearest and age last mortality rates.

- There are no plans to provide gender-blended versions of the 2017 CSO mortality table. Companies can create these versions from the gender specific rates as needed.

### IMPACT OF THE 2017 CSO VALUATION TABLE ON RESERVES

Historically, when a new valuation table was developed, the actuarial team responsible for its development would evaluate its effect on a representative term and whole life product design. With the development of the 2015 VBT and 2017 CSO tables the approach in testing the impact was to use a “field test” of sorts. During first quarter 2015 participating companies evaluated beta versions of the new valuation tables. Complete results of this impact study can be found in the SOA report.

Overall, there are reductions in reserves with the introduction of the 2017 CSO valuation mortality table. For permanent products the reductions are in the range of 5 percent to 10 percent in early policy years, with the reduction grading off over years to maturity. For the ULSG product, the reduction does not grade off as steadily as for the whole life product reserves. Table 1 provides the ratio of 2017 CSO reserves to 2001 CSO reserves by product type and policy year for each of three table structures.

For term products the analysis looks at the ratio of reserves on the 2017 basis to reserves on the 2001 basis over the level premium period for a 20 year level premium term to age 95 product. Reserve reductions are in the range of 29 percent to 46 percent, depending on policy year and table structure. Table 2 provides

**Table 2**  
**2017 CSO Mean Reserve as Percent of 2001 CSO Mean Reserve**  
 20 Year Term Product Overall Results

	t = 5	t = 10	t = 15	t = 20
5-Class Ultimate	62%	60%	62%	64%
2-Class Ultimate	55%	54%	55%	60%
1-Class Ultimate	71%	65%	68%	70%
5-Class S&U	67%	67%	69%	64%

these ratios for the ultimate format of the tables and the 5-Class Select & Ultimate format.

For all three product types, the characteristics of the manner in which these reductions are distributed between gender, class and age are largely consistent.

- A greater reduction is attributable to male risks than to female risks.
- A greater reduction is attributable to non-tobacco risks than to tobacco risks.
- Within the 5-class structure, more reduction is evident in the residual class than in the preferred classes. This may be due to underlying mortality changes as well as the method used to split the classes.

The analysis also looked at several other aspects or characteristics of the new mortality tables for use in valuation.

- The select and ultimate table structure was found to produce a higher reserve than the ultimate only table structure.
- Reserves calculated using the more granular risk class structure (e.g., 5-Class) will aggregate to reserves calculated using the less granular risk class structure (e.g., 2-Class) if the aggregation is performed with the weightings used by the Table Team to create the more granular tables.
- The approach to loading the basic table for use in valuation was different than the approach used for the 2001 CSO and 1980 CSO tables. These earlier tables used a function of the reciprocal of the curtate expectation of life. The new table uses a percentage load that varies by attained age. Both approaches, however, produce a percentage load that decreases by age and an absolute load that generally increases with age. The impact study analysis demonstrates that relative margin has increased for reserves calculated using the 2017 CSO tables as compared to reserves calculated using the 2001 CSO tables.

As part of the impact study, companies also evaluated a beta version of the 2014 VBT. (The 2014 VBT was available for testing in beta version and was later improved one year to 2015

VBT. The 2015 VBT is the table available on the SOA's website). A VM-20 deterministic reserve calculation was used to calibrate the net premium reserve (NPR) against the deterministic reserve. Insights gained through this analysis will inform future definitions of NPR.

Using a one-year cohort of business the companies forecast the deterministic reserve as well as the NPR reserve on the 2001 CSO

and on the 2017 CSO. The majority of data submitted was for term and ULSG. Outcomes of this modeling exercise vary by contributing company, but even so, certain consistent relationships emerged.

- The 2017 CSO table provides a markedly lower NPR pattern (NPR (2017)) as compared to the NPR pattern under the 2001 CSO (NPR (2001)). This is particularly true for term products.
- Most term products tested show an NPR based on 2001 CSO in excess of the deterministic reserve by the middle of the level premium term period, while the NPR based on 2017 CSO is equal to or less than the deterministic reserve during the level premium term period. ULSG products, on the other hand, demonstrated deterministic reserves greater than NPR regardless of the valuation basis used in the NPR calculation.
- Where both the limited fluctuation credibility method and margins and the Bühlmann credibility method and margins were tested, the Bühlmann approach yielded a slightly lower modeled reserve amount.

The reader is encouraged to review the detail in the impact study report to appreciate and understand the results which are only summarized in this article.

### IMPLEMENTATION OF THE 2015 VBT AND 2017 CSO TABLES

Historically, new valuation tables were first adopted by regulators as approved for use, then traveled through an individual state adoption process. The Standard Valuation Law as revised in 2009 (SVL) lays out requirements for a Valuation Manual, which in turn specifies appropriate minimum reserve standards. The Valuation Manual need only be updated or revised to acknowledge new mortality tables. The revision process requires only that the revision move through regulatory channels. Therefore, the individual state adoption process is unnecessary for states that have adopted the 2009 revisions to the SVL.

During the summer national meeting of NAIC, the 2015 VBT was adopted for use in VM-20. The corresponding margins, however, were still under discussion at that time. As this arti-

cle is written, the implementation of the 2017 CSO mortality table is specified in several amendment proposal forms, for consideration of the Life and Annuity Task Force. Assuming these proposals are adopted, the specific conditions outlined below will apply. The new tables will also impact aspects of Actuarial Guidelines XXXVIII (AG 38) and XLVIII (AG 48), and these are also included below.

#### VM-00

Following the operative date of the Valuation Manual, a company may elect to establish minimum reserves according to Appendix A (VM-A) and Appendix C (VM-C) for business otherwise subject to VM-20 requirements and issued during the first three years following the operative date of the Valuation Manual. A company electing to establish reserves under requirements of VM-A and VM-C may elect to use the 2017 CSO as the mortality standard following the conditions outlined in VM-20 Section 3.

#### VM-02

VM-02 outlines minimum nonforfeiture mortality and interest. Policies issued beginning Jan. 1, 2017 may use the 2017 CSO mortality table as basis for nonforfeiture values. Policies issued beginning Jan. 1, 2020 must use the 2017 CSO mortality table as basis for nonforfeiture values. The preferred structure tables are not allowed for use in determining nonforfeiture values.

#### VM-20

Section 3 specifies the methods and assumptions for the net premium reserve. Again, the company may use the 2017 CSO for policies issued beginning Jan. 1, 2017 and must use the 2017 CSO for policies issued beginning Jan. 1, 2020. This section also specifies the conditions for application of the 2017 CSO, that is which table structures are permitted when separate rates for smoker and nonsmokers are offered; when separate rates are not offered; and when gender-blended tables apply. Section 3 also outlines the conditions for using the preferred structure tables. These requirements parallel those found in Model 815 and Actuarial Guideline XLII, but apply to the 2017 CSO Preferred Structure tables.

#### VM-M

VM-M serves as an appendix to the Valuation Manual listing all applicable valuation mortality tables (Section 1) and industry experience tables (Section 2) for use in statutory valuations. Section 1 now includes a new paragraph H specifying the 2017 CSO mortality tables. Section 2 will include recognition of the 2015 VBT mortality tables as available for use as industry tables.

#### AG 38 8D

Language in AG 38 8D.a.2 for the Primary Reserve Methodology specifies the applicable version of the Valuation Manual is any version adopted by the full NAIC as of July 1 preceding the valuation date. Therefore, because the adoption of the

2015 VBT happened after July 1, 2015, for 2015 valuations of the AG 38 8D deterministic reserve, the 2008 VBT continues to be the required industry mortality table. The 2015 VBT will be the industry mortality basis for AG 38 8D deterministic reserve calculations performed for year-end 2016. An exception applies for companies using the 2008 VBT Limited Underwriting table; this table continues to serve as the industry table since there is no comparable table within the 2015 VBT family of tables.

#### AG 48

In the description of the Actuarial Method, AG 48 language specifies that prior to implementation of PBR the Actuarial Method shall include any amendments to VM-20 adopted by the Life Actuarial Task Force (LATF) no later than September 30th immediately preceding the year-end analysis required by AG 48. Because the 2015 VBT reached adoption in August 2015, the 2015 VBT is the industry mortality table for analysis performed as of year-end 2015. However, further action by the NAIC on the 2015 VBT margin table and the underwriting criteria scoring tool (for use in mapping a company's preferred risk classes) will be needed for the 2015 VBT to be considered fully operative. ■



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#### ENDNOTES

- <sup>1</sup> See <https://soa.org/Research/Research-Projects/Life-Insurance/research-cso-impact-study.aspx> for the complete report.