

Long-Term Care Insurance Mortality and Lapse Study

Developed by the Long-Term Care Valuation Work Group
of the American Academy of Actuaries
and the Society of Actuaries Research Institute

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Long-Term Care Insurance (LTC) Mortality and Lapse Study

- [Study Released November 2021](#)
- Developed by the Long-Term Care Valuation Work Group of the American Academy of Actuaries and the Society of Actuaries Research Institute



Requests of the LTC Valuation Work Group

- Develop a replacement mortality table for LTC active life reserves
 - Based on the 2012 Individual Annuity Mortality Table
 - Recommend a margin for conservatism
- Develop a replacement lapse table
 - Recommend a margin for conservatism
- Consider developing tables for valuation on total lives basis as well as active lives basis



Executive Summary

- Developed valuation mortality table
 - Mortality is select and ultimate; all previous valuation mortality tables have been aggregate
 - Optional factors are provided for marital status and risk class
 - Mortality tables are provided for both total lives and active lives (off-claim) exposures
 - Margin for valuation mortality tables is included
 - Tables are included in the report as an Excel file



Executive Summary

- Developed valuation lapse table
 - Valuation lapse tables are developed separately for individual and group coverages; current valuation lapse tables vary for group coverage only for durations 5+ (3% v 2%)
 - Optional factors are provided for marital status and risk class for individual coverages only
 - Lapse tables are provided for both total lives and active lives (off-claim) exposures
 - Margin for valuation lapse tables is included



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Recommended Mortality Tables (Total Lives)



Death Counts (Total Lives)

By Sex, Risk Class, Attained Age, and Marital Status

| Attained Age | Female: Preferred Risk | | | Female: Standard Risk | | | Male: Preferred Risk | | | Male: Standard Risk | | |
|--------------|------------------------|---------------|---------------|-----------------------|---------------|---------------|----------------------|--------------|---------------|---------------------|---------------|---------------|
| | Married | Single | Total | Married | Single | Total | Married | Single | Total | Married | Single | Total |
| Under 60 | 217 | 113 | 330 | 373 | 184 | 557 | 180 | 69 | 249 | 384 | 113 | 497 |
| 60-64 | 393 | 194 | 587 | 708 | 357 | 1,065 | 407 | 106 | 513 | 887 | 192 | 1,079 |
| 65-69 | 670 | 346 | 1,016 | 1,329 | 839 | 2,168 | 795 | 177 | 972 | 1,720 | 425 | 2,145 |
| 70-74 | 1,022 | 716 | 1,738 | 2,402 | 1,670 | 4,072 | 1,375 | 370 | 1,745 | 3,331 | 934 | 4,265 |
| 75 | 270 | 252 | 522 | 650 | 520 | 1,170 | 414 | 115 | 529 | 938 | 293 | 1,231 |
| 76 | 266 | 288 | 554 | 717 | 562 | 1,279 | 454 | 148 | 602 | 1,112 | 332 | 1,444 |
| 77 | 272 | 296 | 568 | 786 | 675 | 1,461 | 515 | 132 | 647 | 1,167 | 342 | 1,509 |
| 78 | 243 | 304 | 547 | 868 | 779 | 1,647 | 485 | 190 | 675 | 1,261 | 460 | 1,721 |
| 79 | 330 | 415 | 745 | 937 | 904 | 1,841 | 527 | 163 | 690 | 1,436 | 520 | 1,956 |
| 80 | 304 | 442 | 746 | 951 | 999 | 1,950 | 527 | 186 | 713 | 1,426 | 594 | 2,020 |
| 81 | 313 | 459 | 772 | 984 | 1,129 | 2,113 | 542 | 169 | 711 | 1,541 | 652 | 2,193 |
| 82 | 338 | 509 | 847 | 999 | 1,224 | 2,223 | 527 | 218 | 745 | 1,534 | 666 | 2,200 |
| 83 | 337 | 591 | 928 | 1,008 | 1,290 | 2,298 | 546 | 228 | 774 | 1,557 | 748 | 2,305 |
| 84 | 307 | 602 | 909 | 925 | 1,345 | 2,270 | 526 | 208 | 734 | 1,549 | 762 | 2,311 |
| 85 | 344 | 694 | 1,038 | 954 | 1,395 | 2,349 | 515 | 241 | 756 | 1,451 | 735 | 2,186 |
| 86 | 316 | 757 | 1,073 | 868 | 1,506 | 2,374 | 487 | 276 | 763 | 1,460 | 756 | 2,216 |
| 87 | 308 | 727 | 1,035 | 791 | 1,520 | 2,311 | 434 | 254 | 688 | 1,302 | 799 | 2,101 |
| 88 | 258 | 803 | 1,061 | 725 | 1,452 | 2,177 | 397 | 208 | 605 | 1,184 | 733 | 1,917 |
| 89 | 248 | 745 | 993 | 624 | 1,362 | 1,986 | 356 | 198 | 554 | 964 | 589 | 1,553 |
| 90-94 | 590 | 2,605 | 3,195 | 1,543 | 4,483 | 6,026 | 943 | 625 | 1,568 | 2,467 | 1,911 | 4,378 |
| 95 and over | 112 | 914 | 1,026 | 266 | 1,542 | 1,808 | 199 | 171 | 370 | 360 | 463 | 823 |
| Total | 7,458 | 12,772 | 20,230 | 19,408 | 25,737 | 45,145 | 11,151 | 4,452 | 15,603 | 29,031 | 13,019 | 42,050 |



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Recommended Mortality Table (Total Lives)

Representative Rates Shown

| LTC -- Male -- 1000qx | | | | | | | | | | | | | | LTC -- Female -- 1000qx | | | | | | | | | | | | | | | | | | | |
|-----------------------|----------|-------|-------|-------|-------|---|---|---|--------|--------|--------|--------|----------|-------------------------|-----------|----------|-------|-------|-------|-------|-------|---|----|----|--------|--------|--------|----------|---------|--------|-----|---|---|
| Issue Age | Duration | | | | | | | | | | | | Ultimate | Att Age | Issue Age | Duration | | | | | | | | | | | | Ultimate | Att Age | | | | |
| | 1 | 2 | 3 | 4 | 5 | . | . | . | 26 | 27 | 28 | 29 | 30 | | 1 | 2 | 3 | 4 | 5 | . | . | . | 26 | 27 | 28 | 29 | 30 | | | | | | |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 45 | 0.36 | 0.50 | 0.63 | 0.75 | 0.88 | . | . | . | 10.87 | 12.52 | 14.43 | 16.60 | 19.08 | 21.90 | 75 | 45 | 0.23 | 0.32 | 0.40 | 0.48 | 0.58 | . | . | . | 7.94 | 8.94 | 10.16 | 11.62 | 13.35 | 15.34 | 75 | | |
| 46 | 0.37 | 0.52 | 0.66 | 0.79 | 0.93 | . | . | . | 12.33 | 14.21 | 16.37 | 18.83 | 21.62 | 24.74 | 76 | 46 | 0.24 | 0.33 | 0.42 | 0.52 | 0.62 | . | . | . | 8.80 | 10.01 | 11.46 | 13.17 | 15.15 | 17.38 | 76 | | |
| 47 | 0.39 | 0.55 | 0.69 | 0.83 | 0.97 | . | . | . | 13.97 | 16.11 | 18.55 | 21.32 | 24.42 | 27.84 | 77 | 47 | 0.24 | 0.35 | 0.45 | 0.55 | 0.67 | . | . | . | 9.84 | 11.28 | 12.98 | 14.94 | 17.15 | 19.61 | 77 | | |
| 48 | 0.40 | 0.57 | 0.72 | 0.87 | 1.03 | . | . | . | 15.84 | 18.26 | 21.00 | 24.08 | 27.47 | 31.17 | 78 | 48 | 0.26 | 0.37 | 0.48 | 0.60 | 0.71 | . | . | . | 11.09 | 12.77 | 14.72 | 16.91 | 19.34 | 22.01 | 78 | | |
| 49 | 0.41 | 0.59 | 0.75 | 0.92 | 1.09 | . | . | . | 17.94 | 20.66 | 23.71 | 27.07 | 30.74 | 34.81 | 79 | 49 | 0.27 | 0.39 | 0.52 | 0.64 | 0.76 | . | . | . | 12.55 | 14.47 | 16.65 | 19.06 | 21.70 | 24.66 | 79 | | |
| 50 | 0.42 | 0.61 | 0.79 | 0.97 | 1.17 | . | . | . | 20.29 | 23.30 | 26.64 | 30.28 | 34.32 | 38.87 | 80 | 50 | 0.28 | 0.42 | 0.55 | 0.68 | 0.82 | . | . | . | 14.21 | 16.37 | 18.76 | 21.38 | 24.31 | 27.63 | 80 | | |
| 51 | 0.44 | 0.65 | 0.84 | 1.04 | 1.25 | . | . | . | 22.90 | 26.19 | 29.80 | 33.80 | 38.31 | 43.89 | 81 | 51 | 0.30 | 0.45 | 0.59 | 0.73 | 0.88 | . | . | . | 16.08 | 18.45 | 21.04 | 23.95 | 27.23 | 31.31 | 81 | | |
| 52 | 0.47 | 0.69 | 0.91 | 1.12 | 1.35 | . | . | . | 25.73 | 29.30 | 33.26 | 37.72 | 43.25 | 49.64 | 82 | 52 | 0.32 | 0.48 | 0.63 | 0.78 | 0.95 | . | . | . | 18.12 | 20.69 | 23.56 | 26.82 | 30.85 | 35.15 | 82 | | |
| 53 | 0.50 | 0.74 | 0.97 | 1.21 | 1.45 | . | . | . | 28.77 | 32.69 | 37.11 | 42.58 | 48.91 | 55.65 | 83 | 53 | 0.35 | 0.52 | 0.68 | 0.85 | 1.04 | . | . | . | 20.32 | 23.16 | 26.38 | 30.37 | 34.63 | 39.89 | 83 | | |
| 54 | 0.53 | 0.79 | 1.04 | 1.29 | 1.57 | . | . | . | 32.10 | 36.47 | 41.88 | 48.14 | 54.82 | 62.97 | 84 | 54 | 0.37 | 0.55 | 0.73 | 0.92 | 1.13 | . | . | . | 22.74 | 25.92 | 29.87 | 34.09 | 39.29 | 45.26 | 84 | | |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | |
| 80 | 5.83 | 10.58 | 15.79 | 21.55 | 28.41 | . | . | . | 399.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 110 | 80 | 4.14 | 7.55 | 11.18 | 15.45 | 20.42 | . | . | . | 334.80 | 338.40 | 345.60 | 360.00 | 360.00 | 360.00 | 110 | | |
| 81 | 6.58 | 12.10 | 18.02 | 24.95 | 32.95 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 111 | 81 | 4.70 | 8.57 | 12.92 | 17.93 | 23.51 | . | . | . | 338.40 | 345.60 | 360.00 | 360.00 | 360.00 | 360.00 | 111 | | |
| 82 | 7.45 | 13.74 | 20.81 | 28.90 | 38.25 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 112 | 82 | 5.27 | 9.85 | 14.95 | 20.62 | 27.41 | . | . | . | 345.60 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 112 | | |
| 83 | 8.35 | 15.77 | 24.05 | 33.54 | 44.54 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 113 | 83 | 5.98 | 11.33 | 17.16 | 24.03 | 32.04 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 113 | | |
| 84 | 9.45 | 18.11 | 27.83 | 39.03 | 51.55 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 114 | 84 | 6.79 | 12.92 | 19.94 | 28.08 | 37.59 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 114 | | |
| 85 | 10.67 | 20.81 | 32.31 | 45.18 | 60.46 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 115 | 85 | 7.61 | 14.91 | 23.24 | 32.94 | 43.82 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 115 | | |
| 86 | 12.03 | 23.44 | 35.98 | 50.68 | 67.49 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 116 | 86 | 8.62 | 16.86 | 26.24 | 36.73 | 49.19 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 116 | | |
| 87 | 13.55 | 26.11 | 40.36 | 56.57 | 74.17 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 117 | 87 | 9.74 | 19.04 | 29.25 | 41.23 | 54.53 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 117 | | |
| 88 | 15.09 | 29.28 | 45.06 | 62.16 | 81.85 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 118 | 88 | 11.00 | 21.23 | 32.84 | 45.70 | 60.94 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 118 | | |
| 89 | 16.92 | 32.69 | 49.51 | 68.60 | 89.82 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 119 | 89 | 12.27 | 23.83 | 36.40 | 51.08 | 67.35 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 119 | | |
| 90 | 18.89 | 35.92 | 54.64 | 75.28 | 97.09 | . | . | . | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 420.00 | 120 | 90 | 13.77 | 26.41 | 40.68 | 56.45 | 74.93 | . | . | . | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 120 | | |



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Recommended Marital Status Adjustment Factors for Mortality Table (Total Lives)

Representative rates shown

| | | Married Adjustment Factors | | | | | | | | | | | | | | | | | |
|-----------|--------------|----------------------------|------|------|------|------|---|---|---|------|------|------|------|----------|--------------|----|-----|---|---|
| Issue Age | Attained Age | Duration | | | | | | | | | | | | Ultimate | Attained Age | | | | |
| | | 1 | 2 | 3 | 4 | 5 | * | * | * | 26 | 27 | 28 | 29 | | | 30 | | | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 45 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 75 | | |
| 46 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 76 | | |
| 47 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 77 | | |
| 48 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 78 | | |
| 49 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 79 | | |
| 50 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 80 | | |
| 51 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 81 | | |
| 52 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 82 | | |
| 53 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 83 | | |
| 54 | | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | * | * | * | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | | 84 | | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| 80 | | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 110 | | |
| 81 | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 111 | | |
| 82 | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 112 | | |
| 83 | | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 113 | | |
| 84 | | 0.97 | 0.97 | 0.97 | 0.98 | 0.98 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 114 | | |
| 85 | | 0.98 | 0.98 | 0.98 | 0.98 | 0.99 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 115 | | |
| 86 | | 0.98 | 0.98 | 0.98 | 0.99 | 0.99 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 116 | | |
| 87 | | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 117 | | |
| 88 | | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 118 | | |
| 89 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 119 | | |
| 90 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 120 | | |

| | | Not Married Adjustment Factors | | | | | | | | | | | | | | | | |
|-----------|--------------|--------------------------------|------|------|------|------|---|---|---|------|------|------|------|----------|--------------|----|-----|---|
| Issue Age | Attained Age | Duration | | | | | | | | | | | | Ultimate | Attained Age | | | |
| | | 1 | 2 | 3 | 4 | 5 | * | * | * | 26 | 27 | 28 | 29 | | | 30 | | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 45 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 75 | |
| 46 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 76 | |
| 47 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 77 | |
| 48 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 78 | |
| 49 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 79 | |
| 50 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 80 | |
| 51 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 81 | |
| 52 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 82 | |
| 53 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 83 | |
| 54 | | 1.28 | 1.28 | 1.28 | 1.28 | 1.28 | * | * | * | 1.14 | 1.11 | 1.08 | 1.06 | 1.03 | 1.00 | | 84 | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 80 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 110 | |
| 81 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 111 | |
| 82 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 112 | |
| 83 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 113 | |
| 84 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 114 | |
| 85 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 115 | |
| 86 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 116 | |
| 87 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 117 | |
| 88 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 118 | |
| 89 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 119 | |
| 90 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | * | * | * | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 120 | |

Recommended Lapse Tables

(Total Lives and Active Lives)



Recommended Individual Lapse Table— Total Lives (With Margins)

| Policy Year | Issue Age Group | | | | | | Marital Status Adjustment Factor | | | Underwriting Class Adjustment Factor | | |
|-------------|-----------------|-------|-------|-------|-------|-----------|----------------------------------|--------|---------|--------------------------------------|----------|--------------|
| | Under 55 | 55-59 | 60-64 | 65-69 | 70-74 | 75 & Over | Married | Single | Unknown | Preferred | Standard | Sub-standard |
| 1 | 5.2% | 2.9% | 3.9% | 3.7% | 4.6% | 6.6% | 0.89 | 1.47 | 1.00 | 1.04 | 0.88 | 1.16 |
| 2 | 4.5% | 2.6% | 2.5% | 2.6% | 3.2% | 4.8% | 0.88 | 1.49 | 1.00 | 1.07 | 0.84 | 1.14 |
| 3 | 3.9% | 2.2% | 2.0% | 2.1% | 2.6% | 4.1% | 0.87 | 1.52 | 1.00 | 1.08 | 0.82 | 1.12 |
| 4 | 3.4% | 2.0% | 1.6% | 1.9% | 2.3% | 3.6% | 0.86 | 1.53 | 1.00 | 1.09 | 0.82 | 1.11 |
| 5 | 2.9% | 1.7% | 1.4% | 1.7% | 2.1% | 3.2% | 0.85 | 1.54 | 1.00 | 1.09 | 0.82 | 1.09 |
| 6 | 2.6% | 1.5% | 1.3% | 1.5% | 2.0% | 3.0% | 0.84 | 1.55 | 1.00 | 1.09 | 0.84 | 1.07 |
| 7 | 2.2% | 1.4% | 1.2% | 1.4% | 1.8% | 2.8% | 0.83 | 1.55 | 1.00 | 1.07 | 0.88 | 1.05 |
| 8 | 1.9% | 1.2% | 1.1% | 1.4% | 1.7% | 2.6% | 0.82 | 1.54 | 1.00 | 1.05 | 0.92 | 1.03 |
| 9 | 1.6% | 1.0% | 1.0% | 1.3% | 1.6% | 2.6% | 0.82 | 1.53 | 1.00 | 1.03 | 0.98 | 1.02 |
| 10 | 1.4% | 0.9% | 0.9% | 1.2% | 1.5% | 2.4% | 0.81 | 1.52 | 1.00 | 0.99 | 1.06 | 1.00 |
| 11 | 1.3% | 0.8% | 0.9% | 1.2% | 1.4% | 2.3% | 0.81 | 1.50 | 1.00 | 0.95 | 1.14 | 0.98 |
| 12 | 1.1% | 0.7% | 0.9% | 1.1% | 1.4% | 2.2% | 0.80 | 1.48 | 1.00 | 0.95 | 1.14 | 0.98 |
| 13 | 0.9% | 0.6% | 0.8% | 1.1% | 1.4% | 2.1% | 0.80 | 1.45 | 1.00 | 0.95 | 1.14 | 0.98 |
| 14 | 0.8% | 0.5% | 0.8% | 1.0% | 1.3% | 2.0% | 0.79 | 1.41 | 1.00 | 0.95 | 1.14 | 0.98 |
| 15 | 0.7% | 0.5% | 0.8% | 1.0% | 1.3% | 2.0% | 0.79 | 1.37 | 1.00 | 0.95 | 1.14 | 0.98 |
| 16 & Over | 0.6% | 0.4% | 0.7% | 0.9% | 1.2% | 2.0% | 0.79 | 1.33 | 1.00 | 0.95 | 1.14 | 0.98 |

Recommended Group Lapse Table—Total Lives (With Margins)

| Policy Year | Issue Age Group | | | | | | |
|-------------|-----------------|-------|-------|-------|-------|-------|-----------|
| | Under 35 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60 & Over |
| 1 | 19.4% | 13.8% | 11.2% | 9.0% | 7.8% | 8.0% | 6.9% |
| 2 | 16.7% | 11.4% | 9.4% | 7.6% | 6.5% | 6.5% | 5.6% |
| 3 | 14.2% | 9.5% | 7.8% | 6.4% | 5.4% | 5.2% | 4.5% |
| 4 | 12.0% | 7.9% | 6.5% | 5.4% | 4.5% | 4.2% | 3.6% |
| 5 | 9.9% | 6.5% | 5.5% | 4.5% | 3.8% | 3.4% | 2.9% |
| 6 | 8.1% | 5.4% | 4.6% | 3.8% | 3.1% | 2.8% | 2.3% |
| 7 | 6.5% | 4.5% | 3.8% | 3.2% | 2.6% | 2.2% | 1.9% |
| 8 | 5.2% | 3.7% | 3.2% | 2.7% | 2.2% | 1.8% | 1.5% |
| 9 | 4.0% | 3.1% | 2.7% | 2.3% | 1.8% | 1.5% | 1.2% |
| 10 | 3.1% | 2.5% | 2.2% | 1.9% | 1.5% | 1.2% | 1.0% |
| 11 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.8% |
| 12 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.8% |
| 13 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.8% |
| 14 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.8% |
| 15 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.8% |
| 16 & Over | 1.9% | 1.7% | 1.5% | 1.4% | 1.1% | 0.8% | 0.6% |



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Recommended Individual Lapse Table— Active Lives (No Margins)

| Policy Year | Issue Age Group | | | | | | Marital Status Adjustment Factor | | | Underwriting Class Adjustment Factor | | |
|-------------|-----------------|-------|-------|-------|-------|-----------|----------------------------------|--------|---------|--------------------------------------|----------|--------------|
| | Under 55 | 55-59 | 60-64 | 65-69 | 70-74 | 75 & Over | Married | Single | Unknown | Preferred | Standard | Sub-standard |
| 1 | 6.1% | 3.4% | 4.6% | 4.4% | 5.4% | 7.8% | 0.89 | 1.47 | 1.00 | 1.04 | 0.88 | 1.16 |
| 2 | 5.3% | 3.0% | 2.9% | 3.1% | 3.8% | 5.7% | 0.88 | 1.49 | 1.00 | 1.07 | 0.84 | 1.14 |
| 3 | 4.6% | 2.6% | 2.3% | 2.5% | 3.1% | 4.8% | 0.87 | 1.52 | 1.00 | 1.08 | 0.82 | 1.12 |
| 4 | 4.0% | 2.3% | 1.9% | 2.2% | 2.7% | 4.2% | 0.86 | 1.53 | 1.00 | 1.09 | 0.82 | 1.11 |
| 5 | 3.4% | 2.0% | 1.7% | 2.0% | 2.5% | 3.8% | 0.85 | 1.54 | 1.00 | 1.09 | 0.82 | 1.09 |
| 6 | 3.0% | 1.8% | 1.5% | 1.8% | 2.3% | 3.5% | 0.84 | 1.55 | 1.00 | 1.09 | 0.84 | 1.07 |
| 7 | 2.6% | 1.6% | 1.4% | 1.7% | 2.1% | 3.3% | 0.83 | 1.55 | 1.00 | 1.07 | 0.88 | 1.05 |
| 8 | 2.2% | 1.4% | 1.3% | 1.6% | 2.0% | 3.1% | 0.82 | 1.54 | 1.00 | 1.05 | 0.92 | 1.03 |
| 9 | 1.9% | 1.2% | 1.2% | 1.5% | 1.9% | 3.0% | 0.82 | 1.53 | 1.00 | 1.03 | 0.98 | 1.02 |
| 10 | 1.7% | 1.1% | 1.1% | 1.4% | 1.8% | 2.8% | 0.81 | 1.52 | 1.00 | 0.99 | 1.06 | 1.00 |
| 11 | 1.5% | 0.9% | 1.0% | 1.4% | 1.7% | 2.7% | 0.81 | 1.50 | 1.00 | 0.95 | 1.14 | 0.98 |
| 12 | 1.3% | 0.8% | 1.0% | 1.3% | 1.6% | 2.6% | 0.80 | 1.48 | 1.00 | 0.95 | 1.14 | 0.98 |
| 13 | 1.1% | 0.7% | 0.9% | 1.3% | 1.6% | 2.5% | 0.80 | 1.45 | 1.00 | 0.95 | 1.14 | 0.98 |
| 14 | 0.9% | 0.6% | 0.9% | 1.2% | 1.5% | 2.4% | 0.79 | 1.41 | 1.00 | 0.95 | 1.14 | 0.98 |
| 15 | 0.8% | 0.6% | 0.9% | 1.2% | 1.5% | 2.4% | 0.79 | 1.37 | 1.00 | 0.95 | 1.14 | 0.98 |
| 16 & Over | 0.7% | 0.5% | 0.8% | 1.1% | 1.4% | 2.3% | 0.79 | 1.33 | 1.00 | 0.95 | 1.14 | 0.98 |



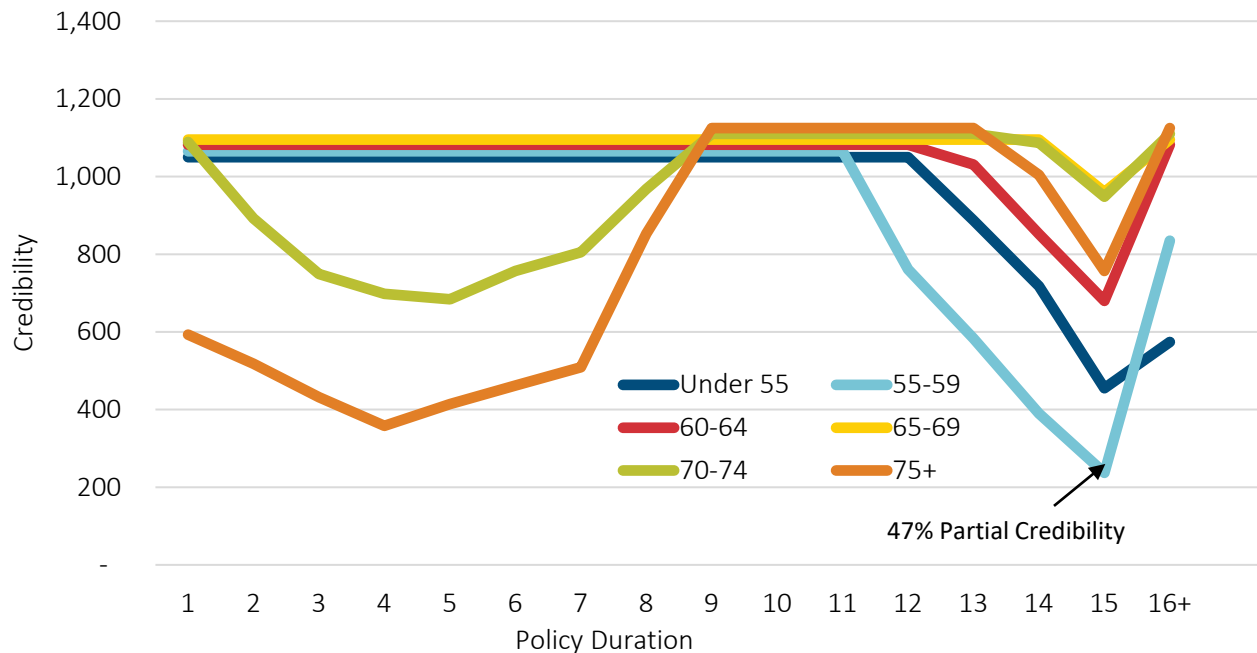
Recommended Group Lapse Table—Active Lives (With Margins)

| Issue Age Group | | | | | | | |
|-----------------|----------|-------|-------|-------|-------|-------|-----------|
| Policy Year | Under 35 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60 & Over |
| 1 | 19.4% | 13.8% | 11.2% | 9.0% | 7.8% | 8.0% | 6.9% |
| 2 | 16.7% | 11.5% | 9.4% | 7.6% | 6.5% | 6.5% | 5.6% |
| 3 | 14.2% | 9.5% | 7.8% | 6.4% | 5.4% | 5.2% | 4.5% |
| 4 | 12.0% | 7.9% | 6.5% | 5.4% | 4.5% | 4.3% | 3.7% |
| 5 | 9.9% | 6.5% | 5.5% | 4.5% | 3.8% | 3.5% | 3.0% |
| 6 | 8.1% | 5.4% | 4.6% | 3.8% | 3.2% | 2.8% | 2.5% |
| 7 | 6.5% | 4.5% | 3.8% | 3.2% | 2.6% | 2.3% | 2.0% |
| 8 | 5.2% | 3.7% | 3.2% | 2.7% | 2.2% | 1.9% | 1.7% |
| 9 | 4.0% | 3.1% | 2.7% | 2.3% | 1.8% | 1.5% | 1.4% |
| 10 | 3.1% | 2.6% | 2.2% | 1.9% | 1.5% | 1.3% | 1.1% |
| 11 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.9% |
| 12 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.9% |
| 13 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.9% |
| 14 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.9% |
| 15 | 2.4% | 2.1% | 1.9% | 1.6% | 1.3% | 1.0% | 0.9% |
| 16 & Over | 1.9% | 1.8% | 1.5% | 1.4% | 1.1% | 0.8% | 0.7% |



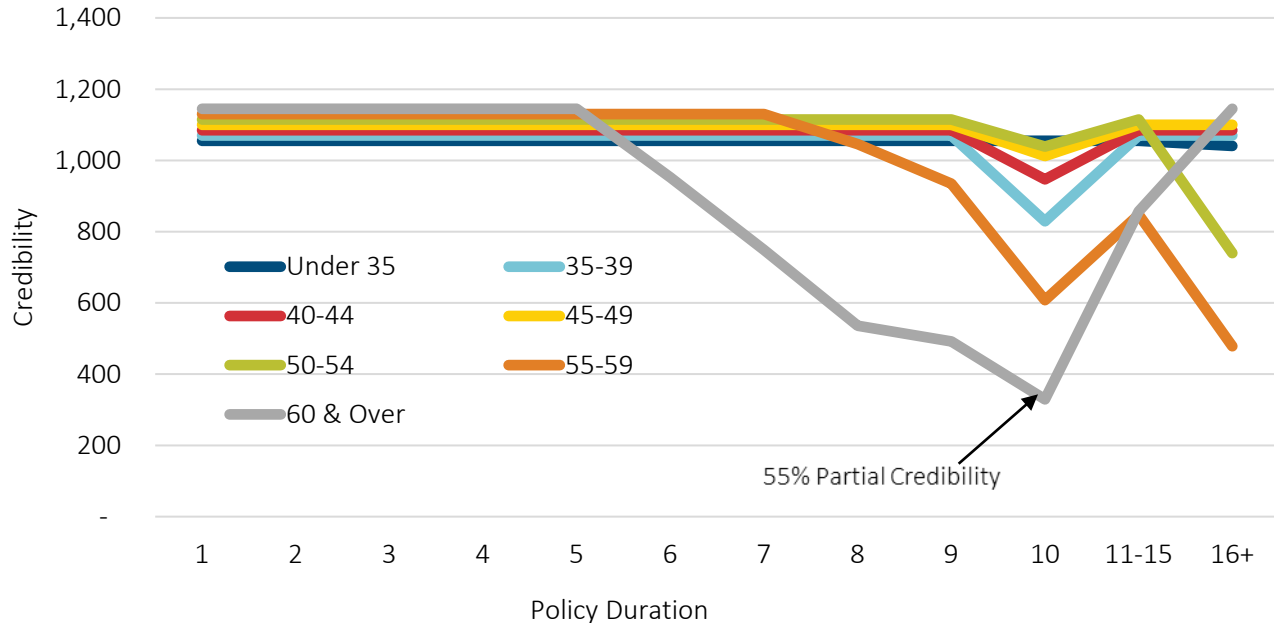
Data Credibility for Individual Lapses

Minimum of Number of Individual Lapses and 1,082 (Full Credibility) by Issue Age Group and Policy Duration



Data Credibility for Group Lapses

Minimum of Number of Group Lapses and 1,082 (Full Credibility) by Issue Age Group and Policy Duration



Mortality Improvement to 2020



Recommended Mortality Improvement

- The study period is 2008 through 2011
- Recommend to apply improvement trend using the 2012 Individual Annuity Mortality Basic tables (2012 IAM) G2 scale from 2010 to 2020 (11 years)
- Recommended tables represent industry experience as of 2020
- G2 scale applies to both total lives and active lives



Alternatives for Mortality Improvement

- The mortality tables can be made dynamic by continuing to apply the G2 scale to future valuation dates
- For first principle valuation approach, G2 scale can be applied to both active lives and disabled lives



Recommended Margins



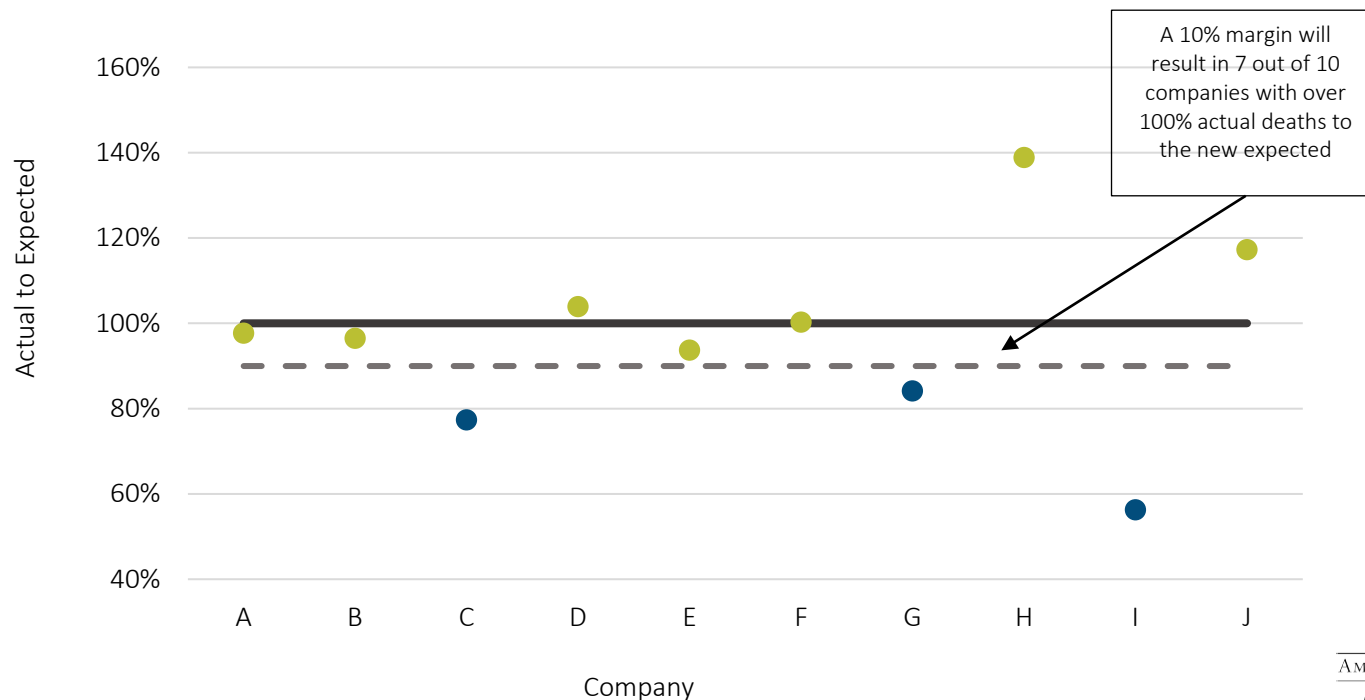
Recommended Margins

- 10% for mortality
- 15% for lapse
- Same for total lives and active lives



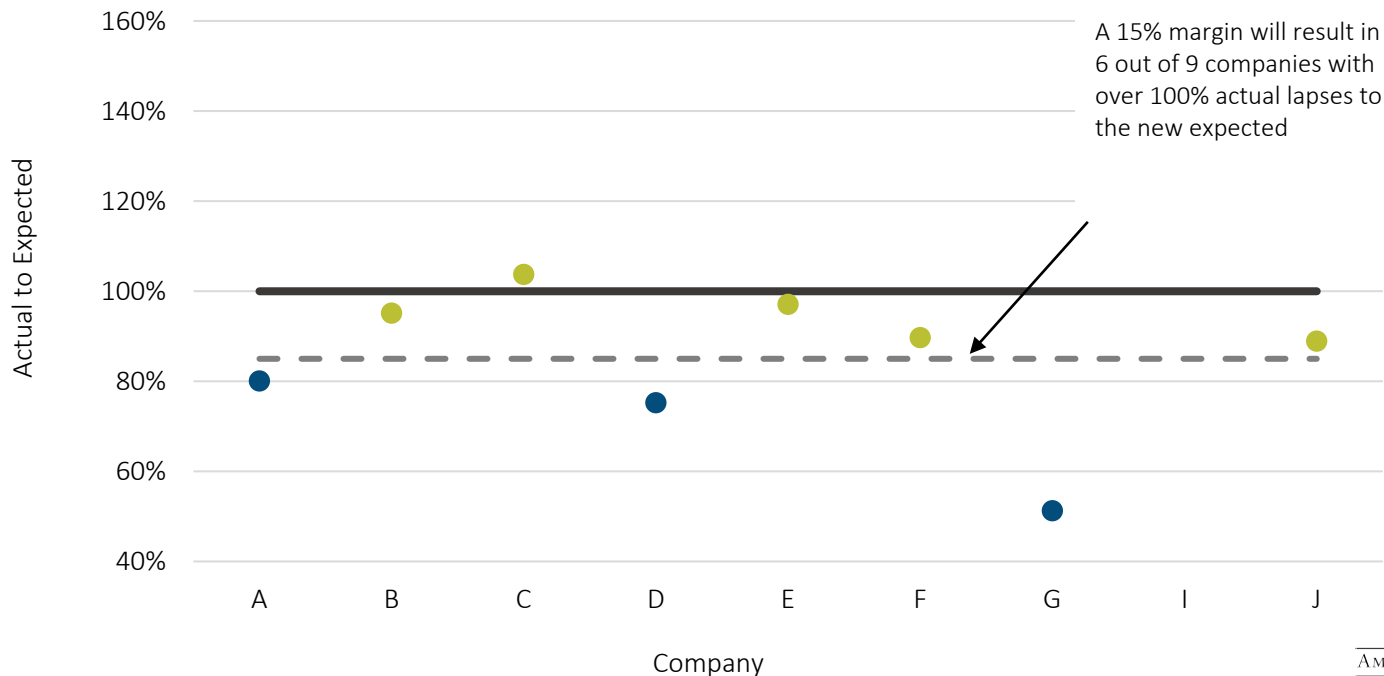
Actual Total Lives Mortality to Expected (Based on Recommended Tables) By Company

Actual-to-Expected Mortality, Total Lives by Company, Without Margins, Policy Years 11 & Over



Actual Individual Total Lives Lapses to Expected (Based on Recommended Tables) By Company

Actual-to-Expected Lapses, Individual Total Lives, by Company, Without Margins, Policy Years 11 & Over

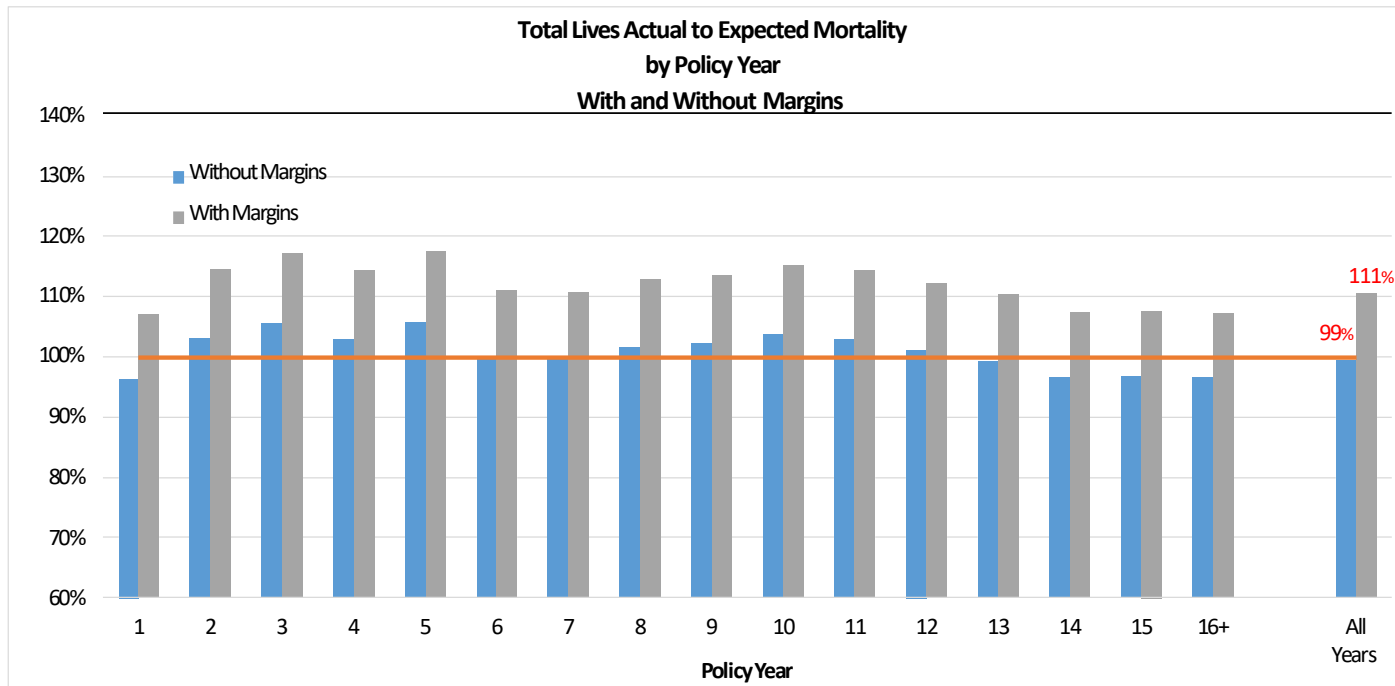


Actual to Expected Mortality Rates

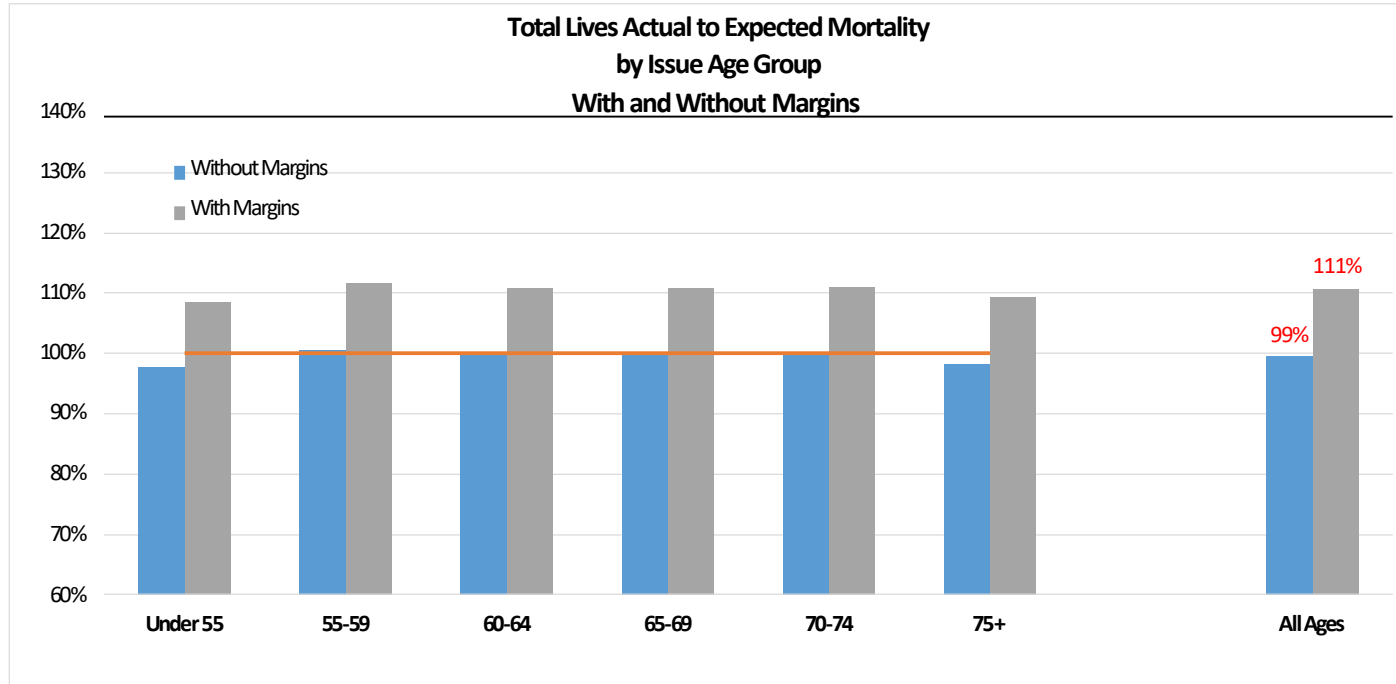
(Expected Based on Recommended Tables)



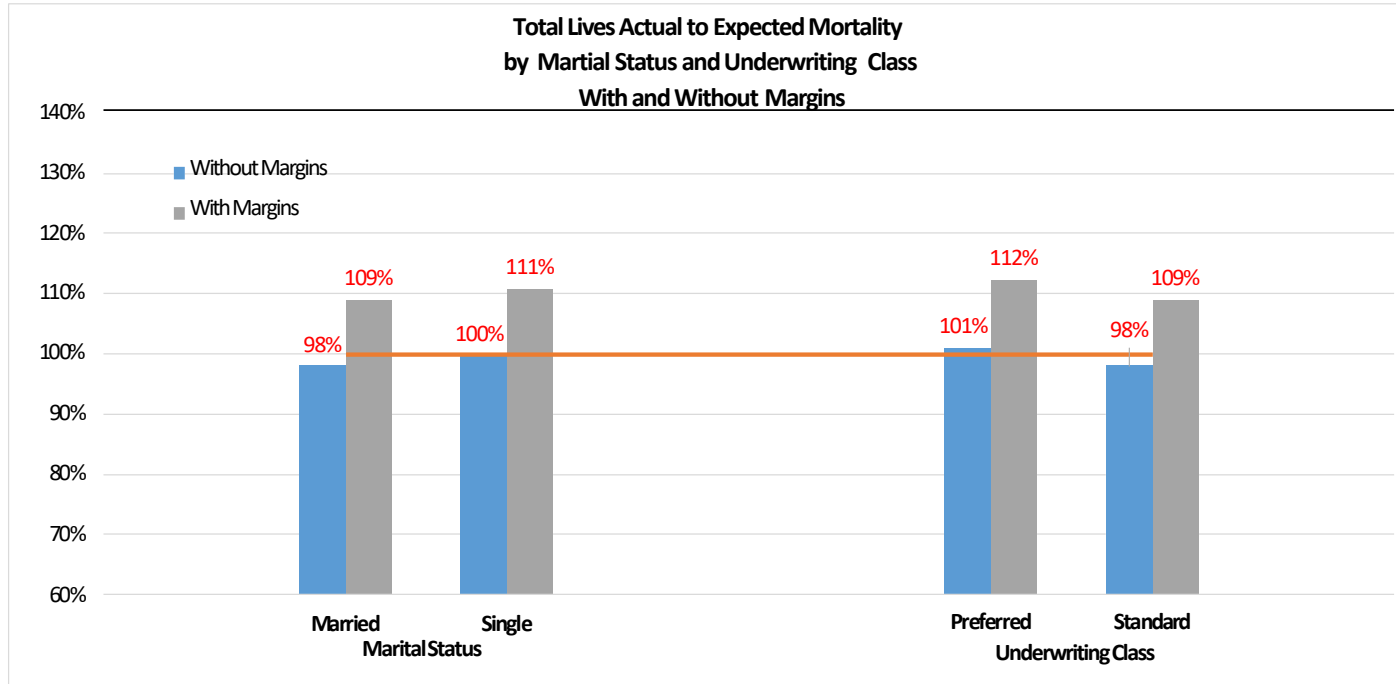
Actual Total Lives Mortality to Expected by Policy Year



Actual Total Lives Mortality to Expected by Issue Age Group



Actual Total Lives Mortality to Expected by Marital Status and Underwriting Class



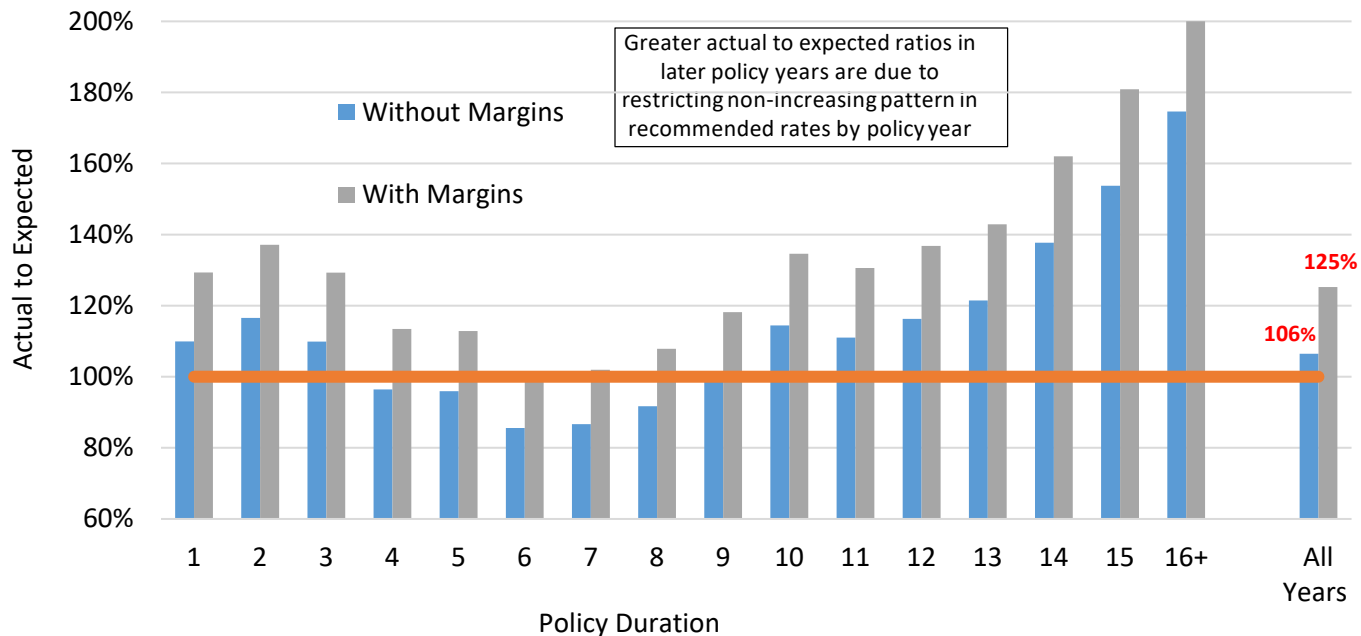
Actual to Expected Lapse Rates

(Expected Based on Recommended)



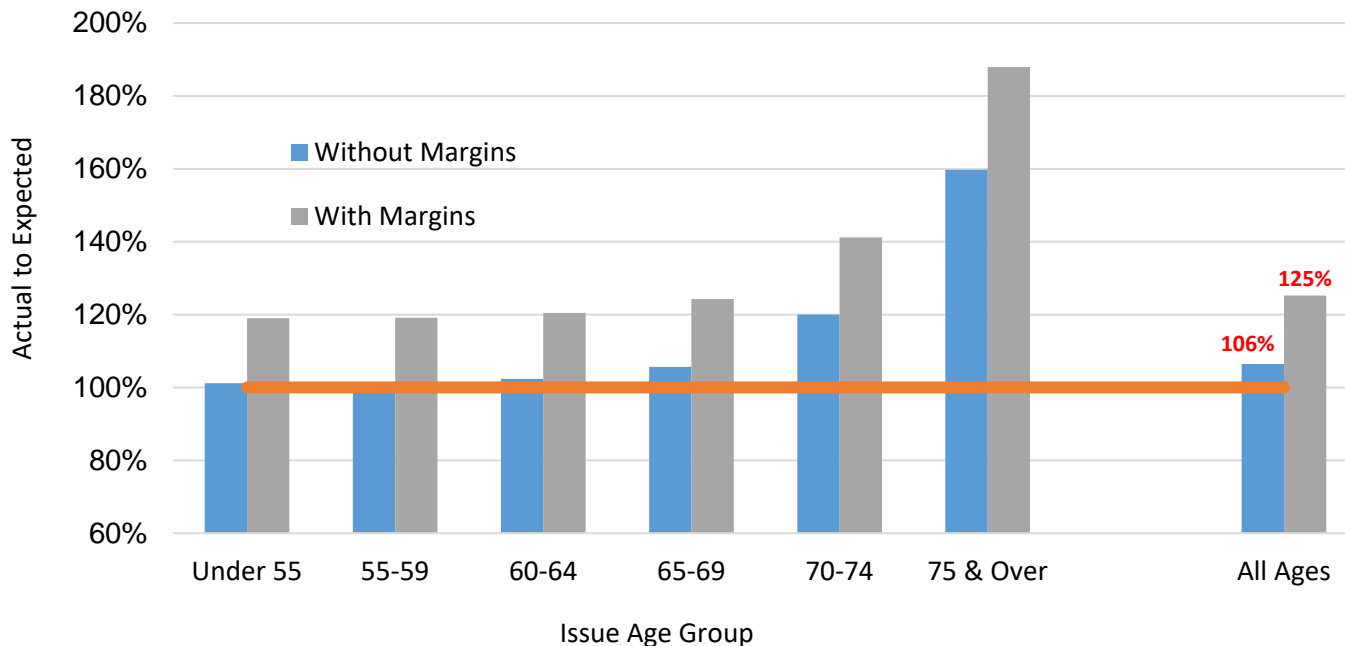
Actual Individual Total Lives Lapses to Expected by Policy Year

Actual-to-Expected Lapses, Individual Total Lives, by Policy Duration, With and Without Margins



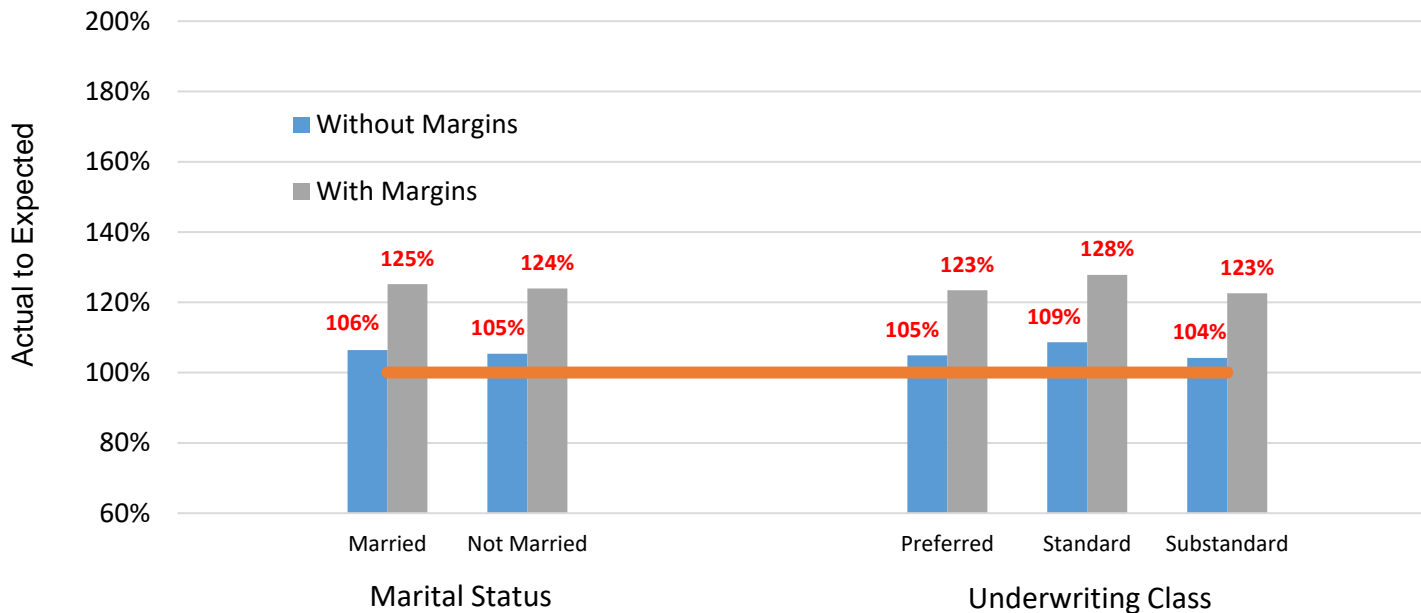
Actual Individual Total Lives Lapses to Expected by Issue Age Group

Actual-to-Expected Lapses, Individual Total Lives, by Issue Age Group, With and Without Margins

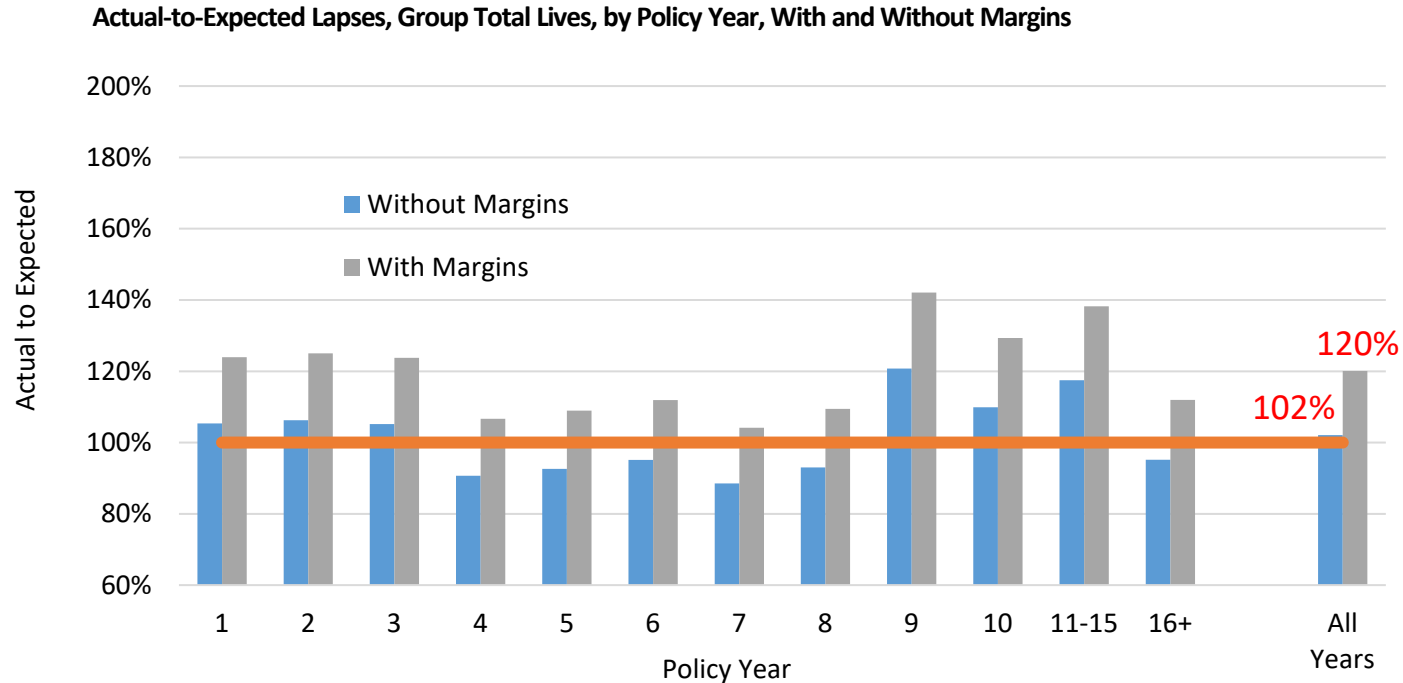


Actual Individual Total Lives Lapses to Expected by Marital Status and Underwriting Class

Actual-to-Expected Lapses, Individual Total Lives, by Marital Status and Underwriting Class, With and Without Margins

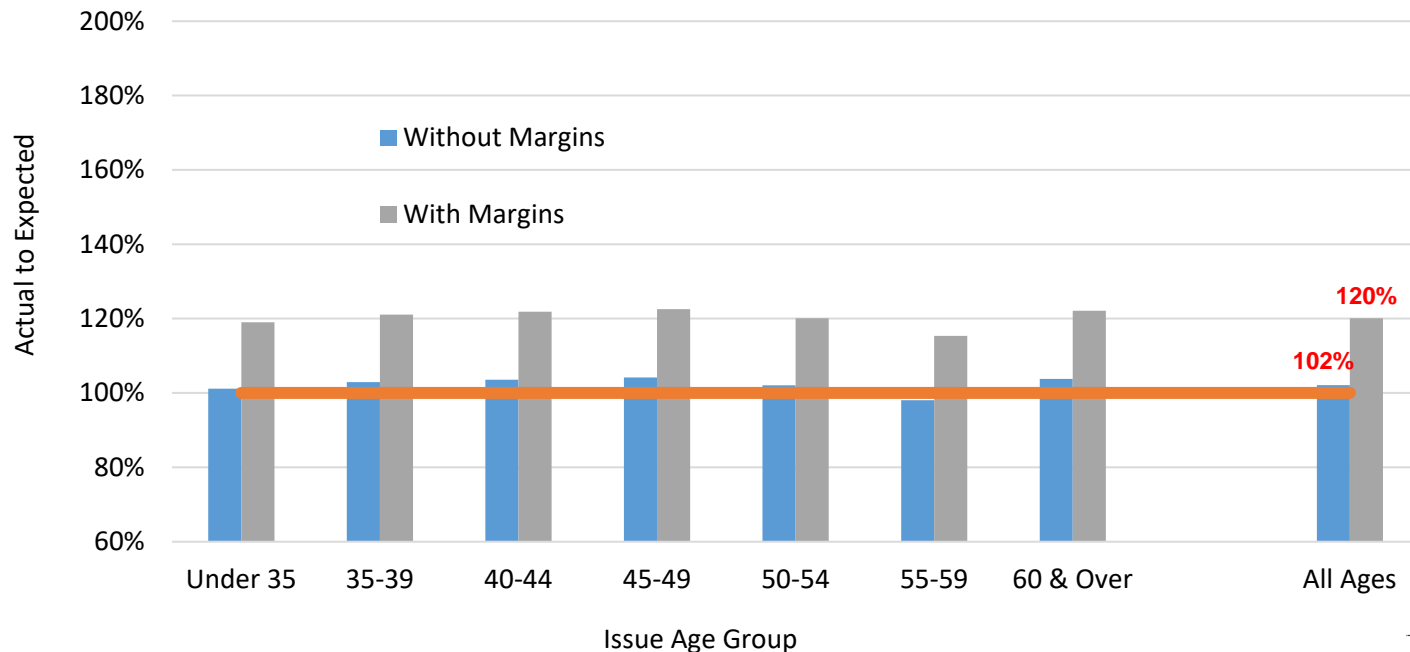


Actual Group Total Lives Lapses to Expected by Policy Year



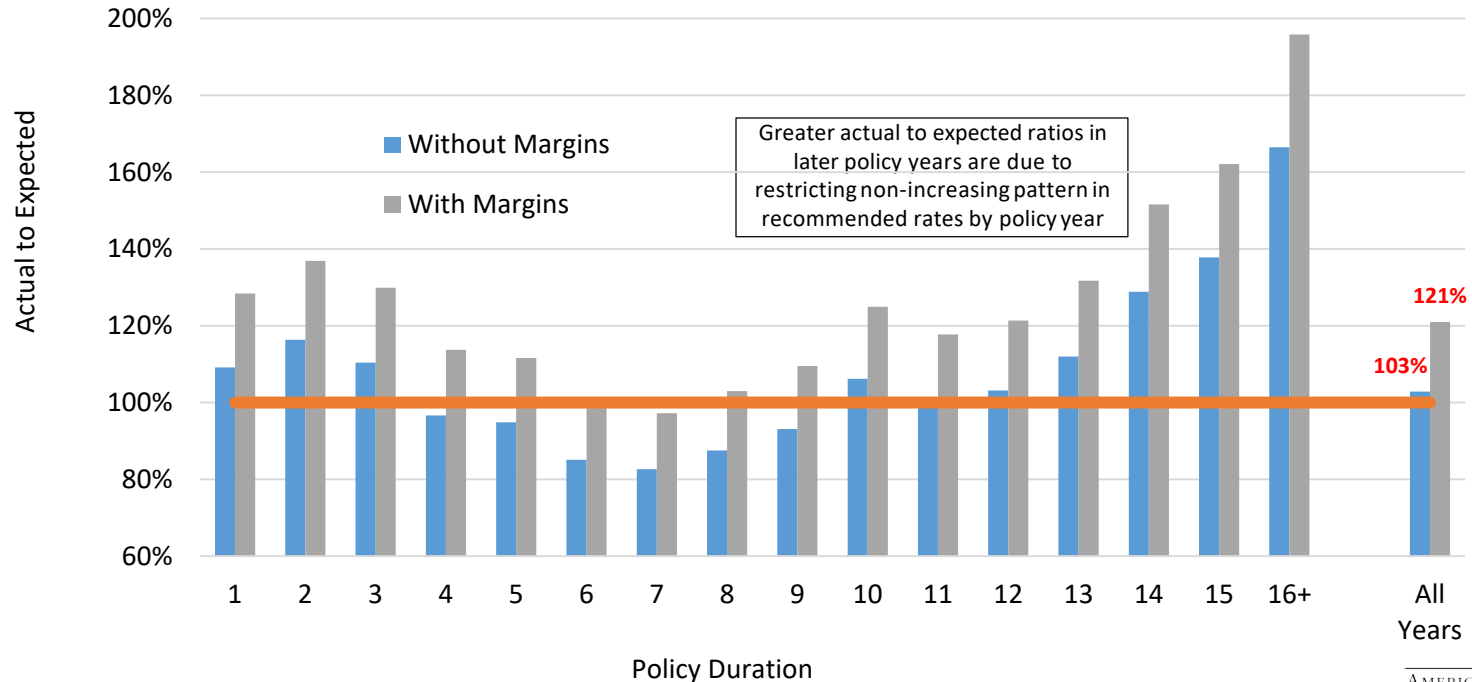
Actual Group Total Lives Lapses to Expected by Issue Age Group

Actual-to-Expected Lapses, Group Total Lives, by Issue Age Group, With and Without Margins



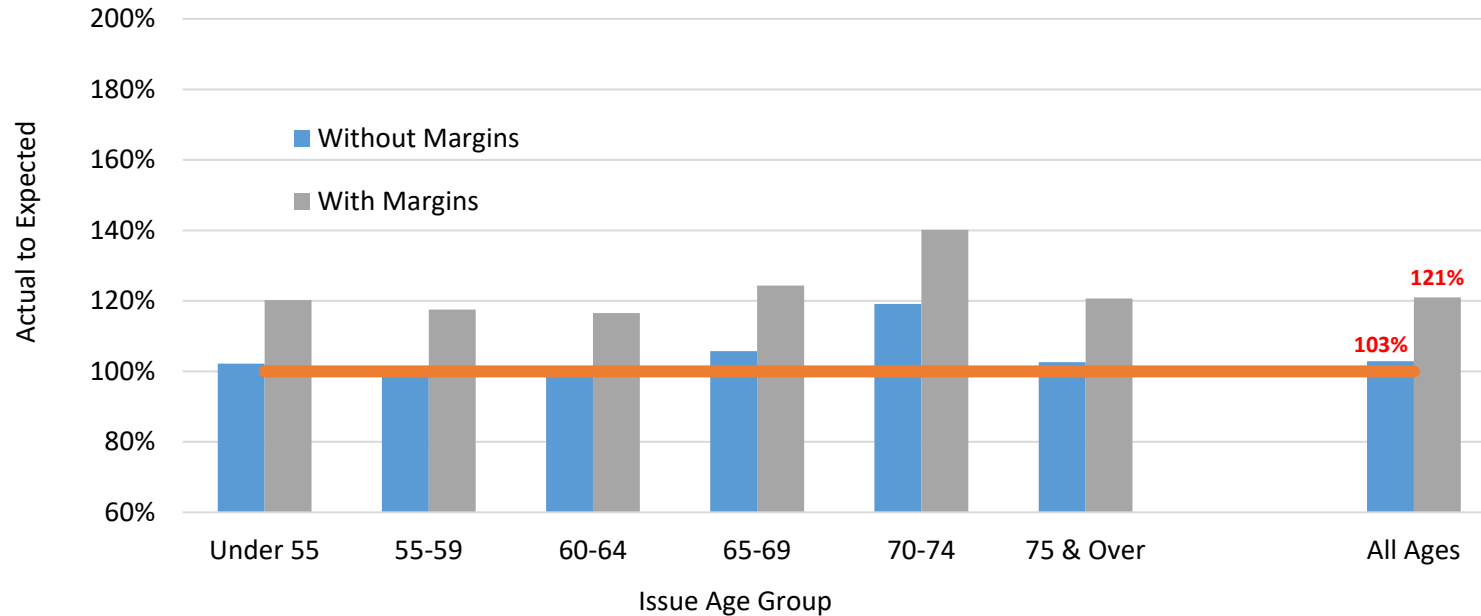
Actual Individual Active Lives Lapses to Lapses by Policy Year

Actual-to-Expected Lapses, Individual Active Lives, by Policy Duration, With and Without Margins



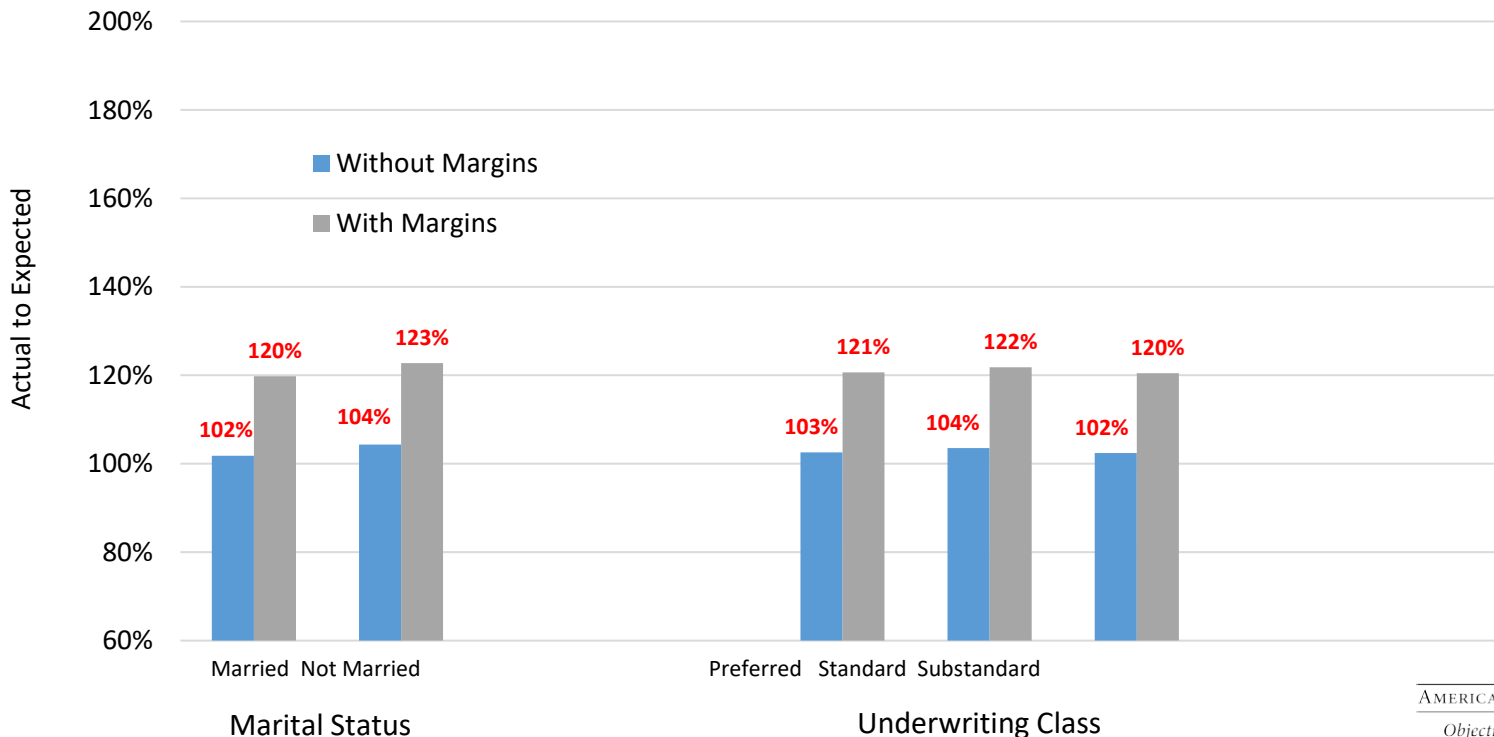
Actual Individual Active Lives Lapses to Expected by Issue Age Group

Actual-to-Expected Lapses, Individual Active Lives, by Issue Age Group, With and Without Margins



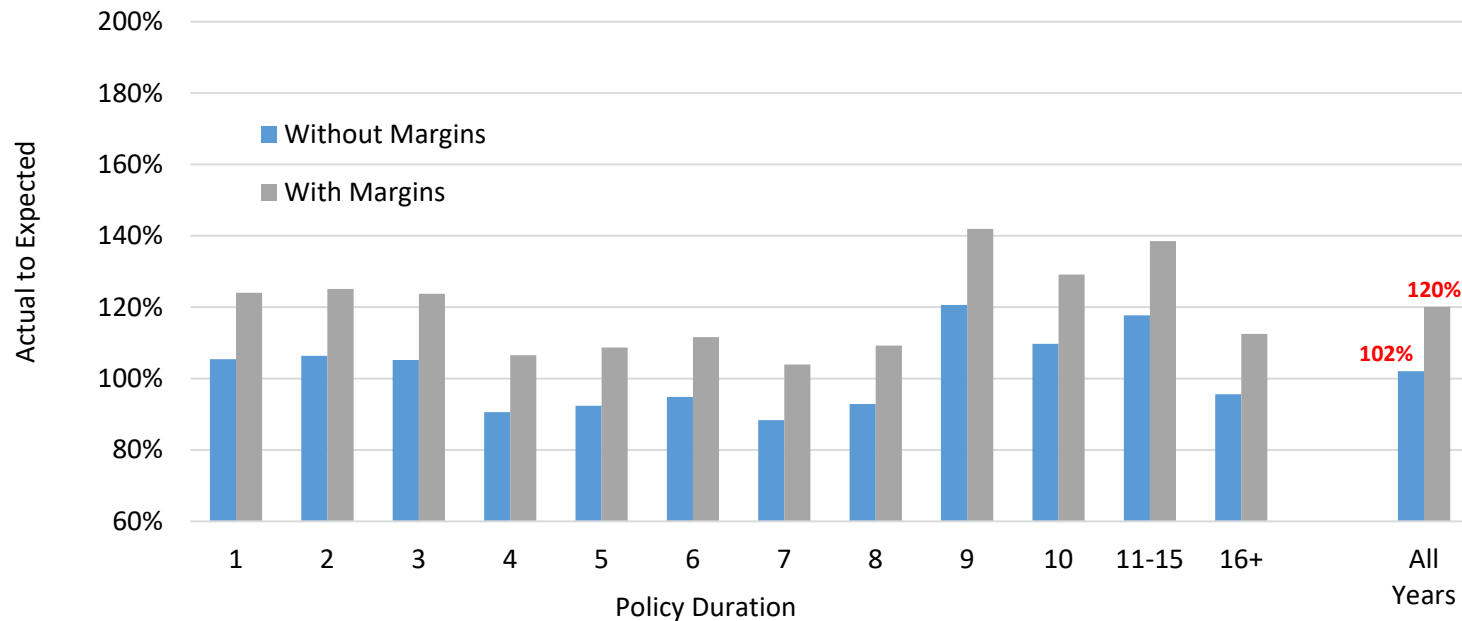
Actual Individual Active Lives Lapses to Expected by Marital Status and Underwriting Class

Actual-to-Expected Lapses, Individual Active Lives, by Marital Status and Underwriting Class, With and Without Margins



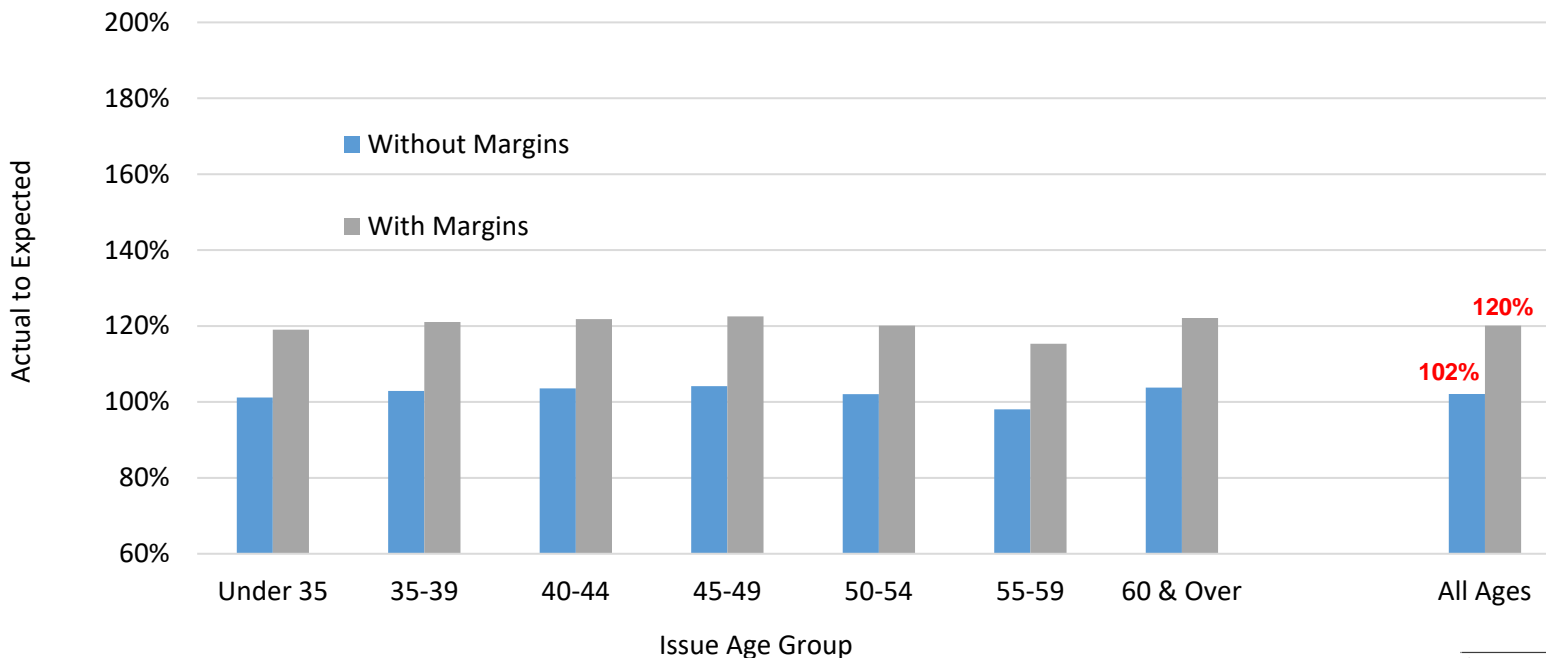
Actual Group Active Lives Lapses to Expected by Policy Year

Actual-to-Expected Lapses, Group Active Lives, by Policy Duration, With and Without Margins



Actual Group Active Lives Lapses to Expected by Issue Age Group

Actual-to-Expected, Group Active Lives, by Issue Age Group, With and Without Margins



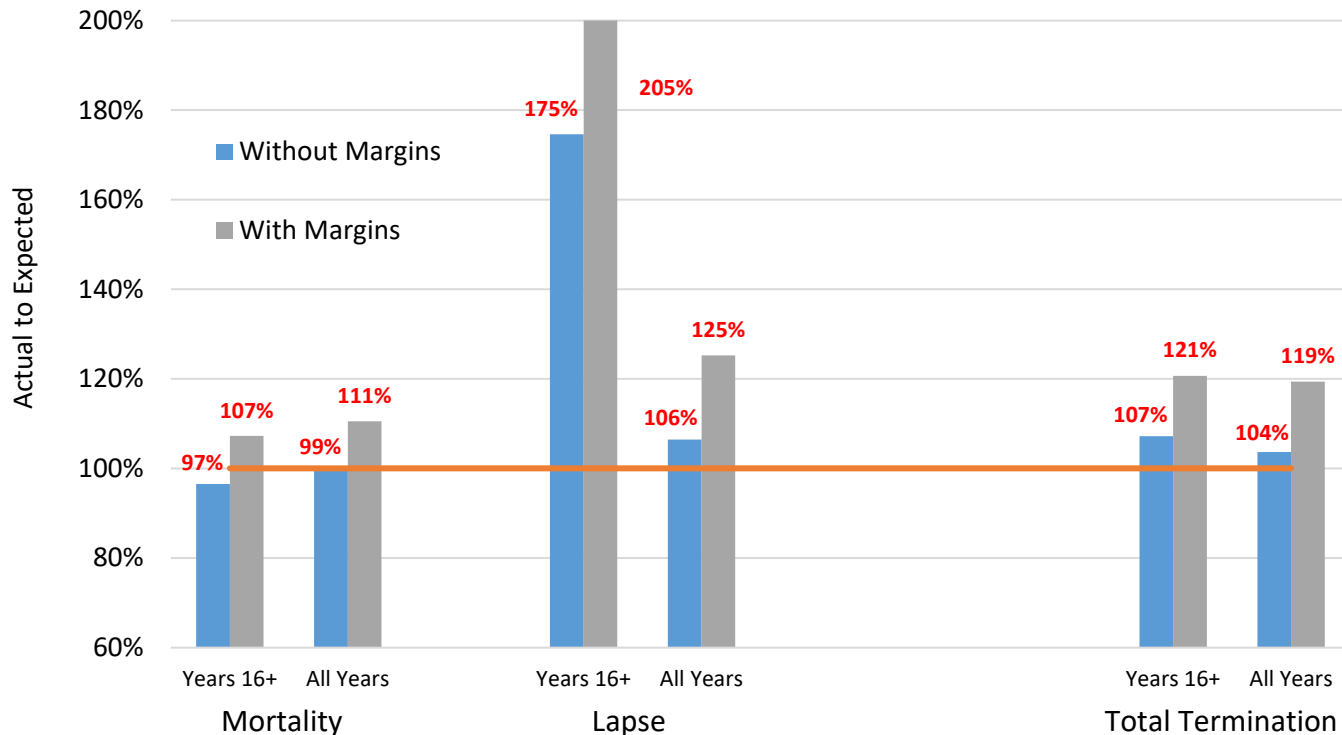
Actual to Expected Total Policy Termination Rates

(Mortality and Lapse Combined—Total Lives Only)



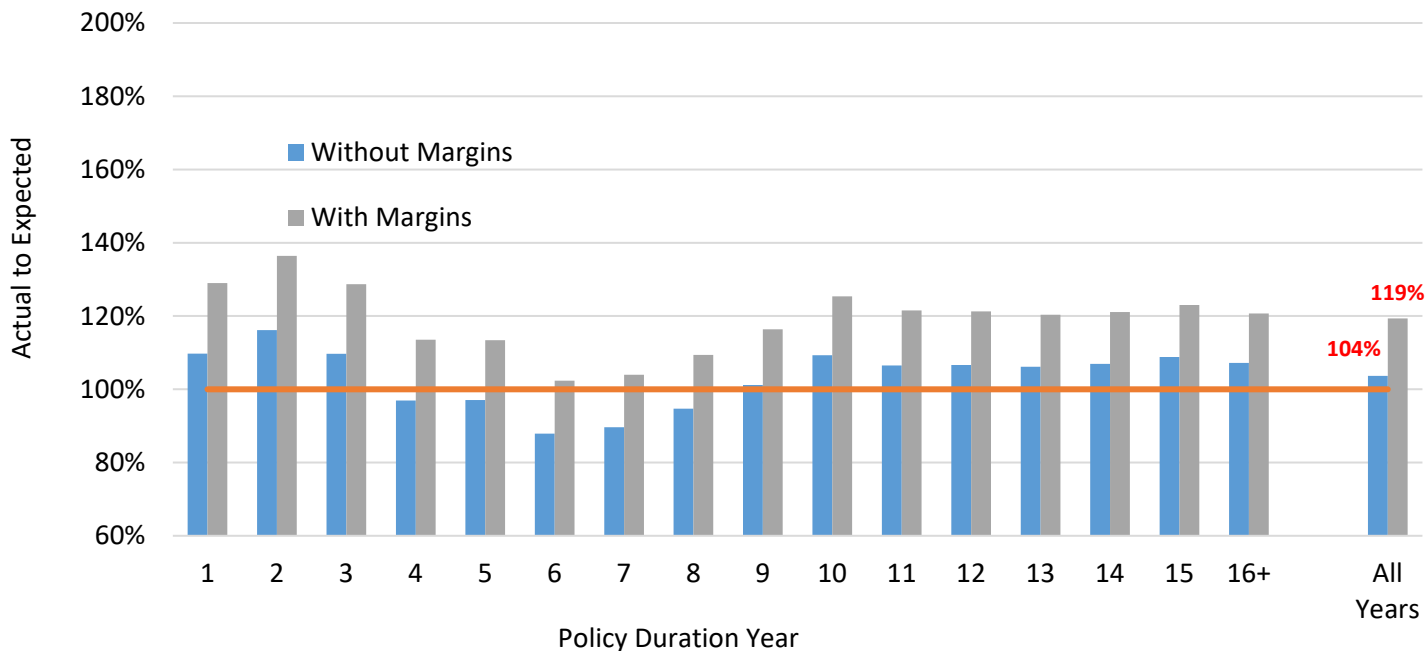
Actual Individual Total Lives to Expected by Mortality and Lapse

Actual-to-Expected Mortality and Lapse, Individual Total Lives, With and Without Margins



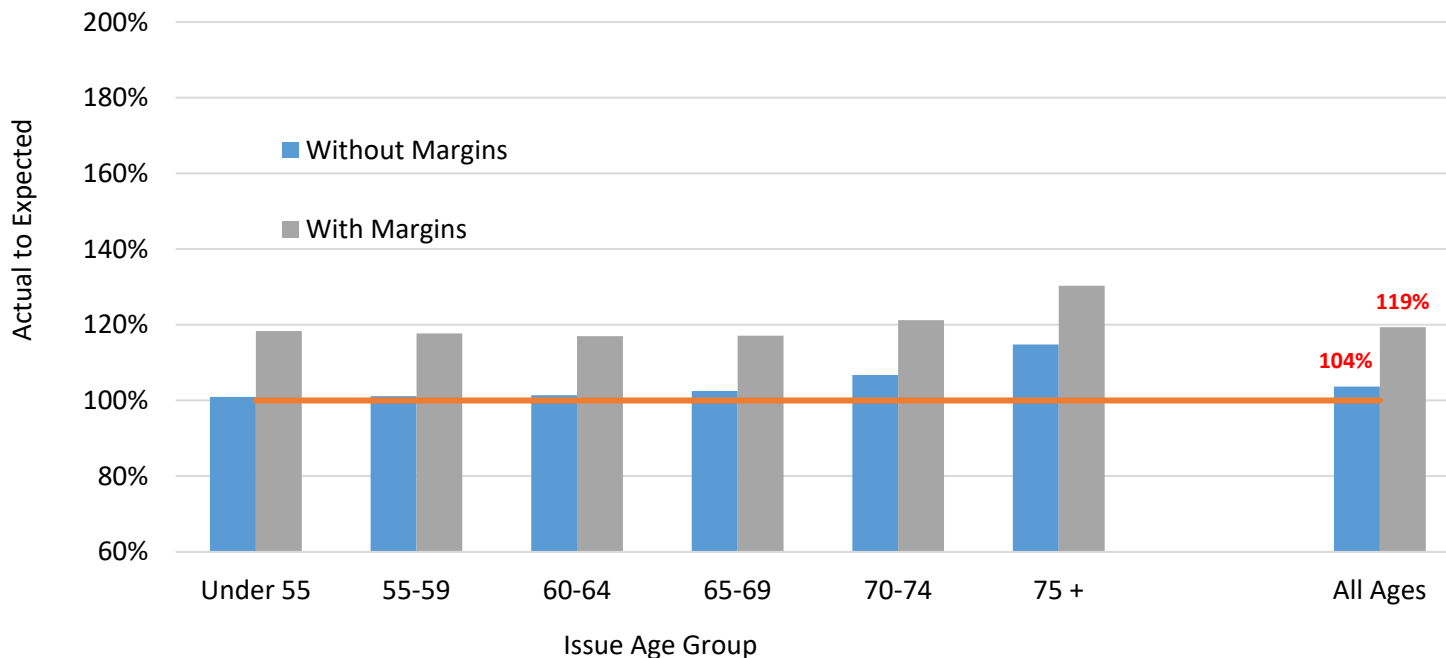
Actual Individual Total Lives Total Terminations to Expected by Policy Year

Actual-to-Expected Total Terminations, Individual Total Lives, by Policy Year, With and Without Margins



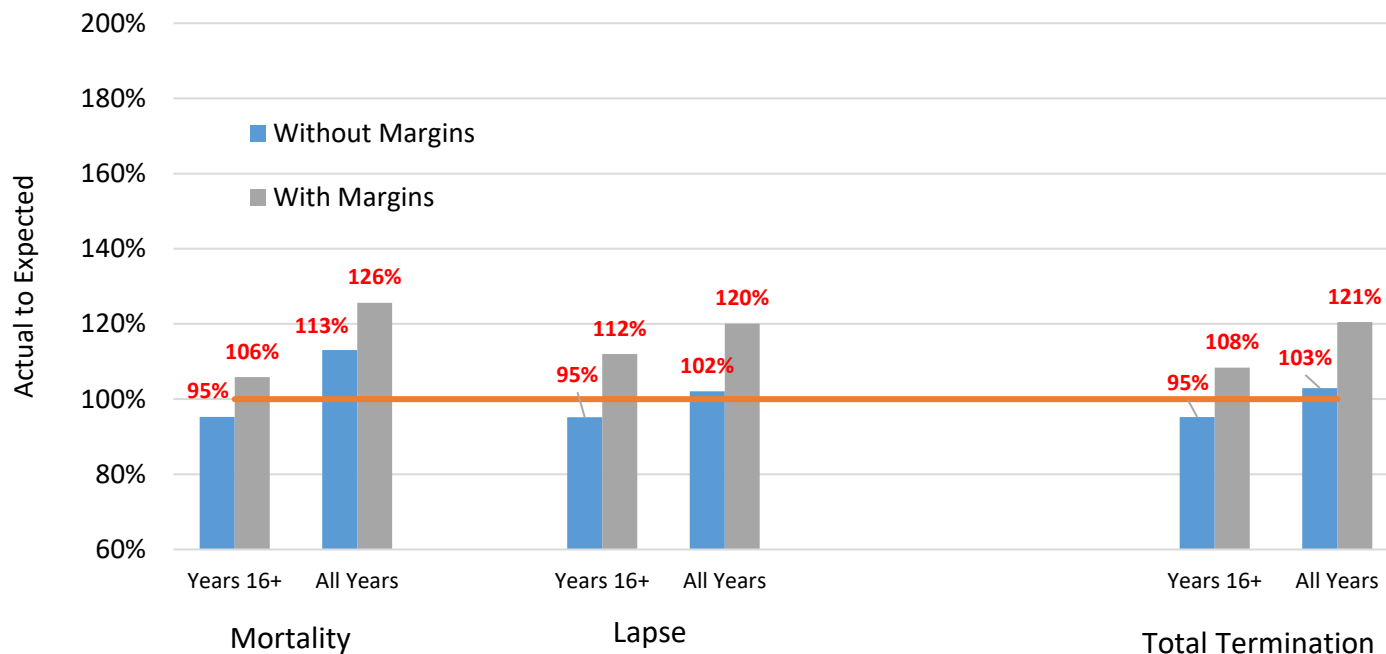
Actual Individual Total Lives Total Terminations to Expected by Issue Age Group

Actual-to-Expected Total Terminations, Individual Total Lives, by Issue Age Group, With and Without Margins



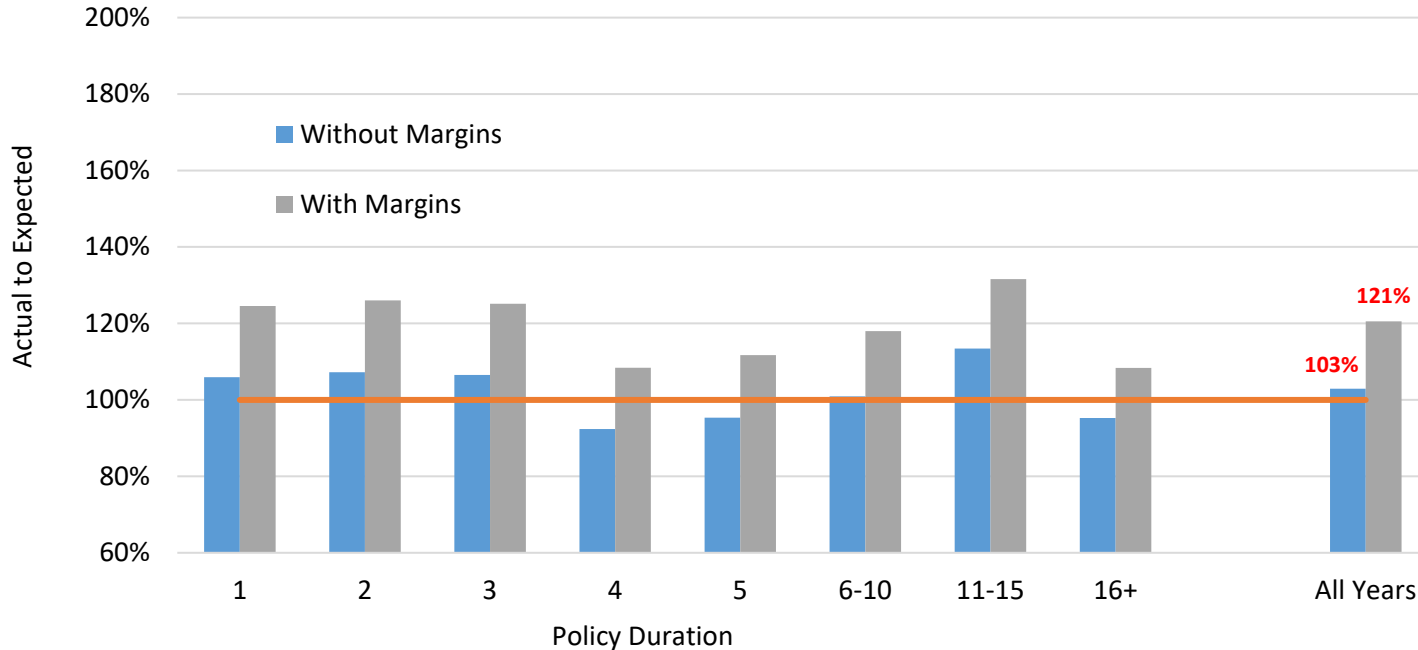
Actual Group Total Lives to Expected by Mortality and Lapse

Actual-to-Expected Mortality and Lapse, Group Total Lives, With and Without Margins



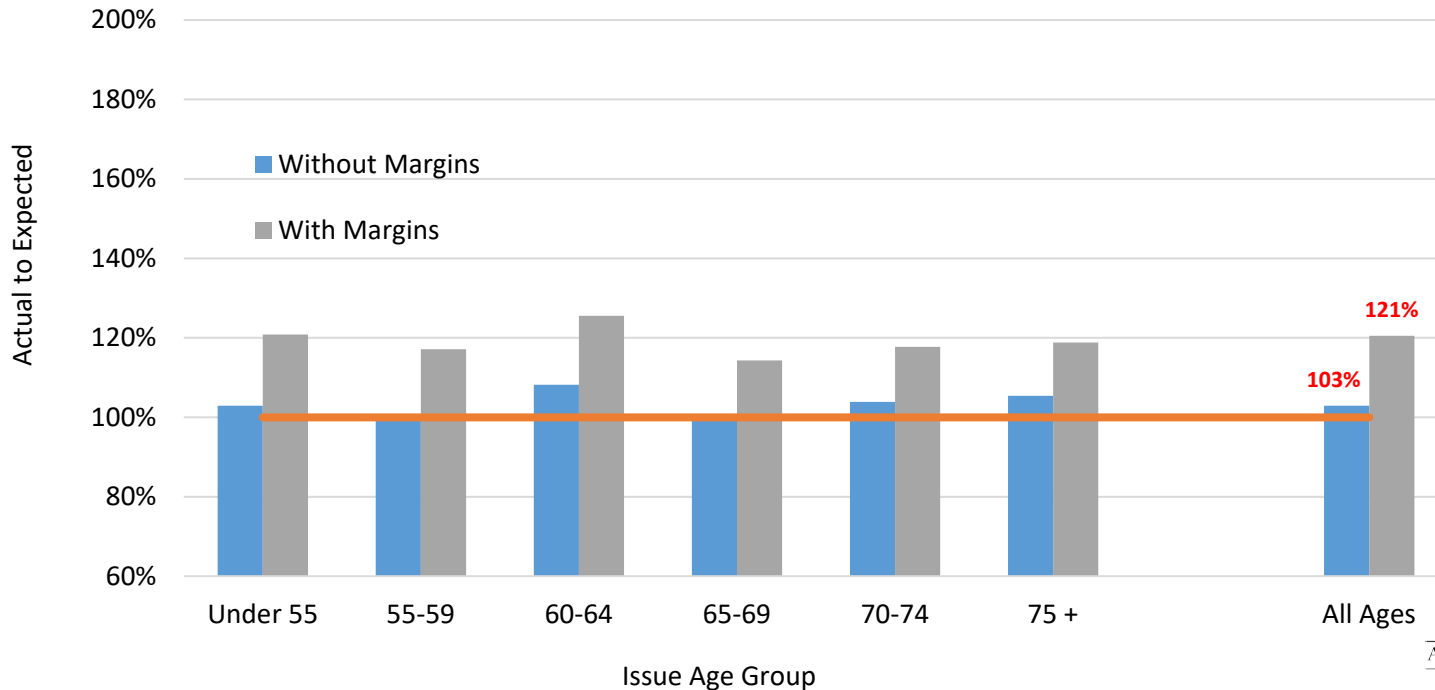
Actual Group Total Lives Total Terminations to Expected by Policy Year

Actual-to-Expected Total Terminations, Group Total Lives, by Policy Duration, With and Without Margins



Actual Group Total Lives Total Terminations to Expected by Issue Age Group

Actual-to-Expected Total Terminations, Group Total Lives, by Issue Age Group, With and Without Margins



Additional Information

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