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Considerations in the Evaluation of Actual-to-
Expected Underwriting Ratios

Don Solow, FSA, MAAA

How important are actual-to— expected ratios?

- Financial transactions take place with *actual* dollars, not *actual-to-expected* dollars
- Therefore the “A/E” ratio is useful only if it helps you make a good estimate of “A”
- It is presumed that the A-to-E ratio demonstrates underwriting accuracy
 - But does it tell the whole story?

My underwriting approach

- I have underwritten all the lives in my town and tracked my results
- Method of underwriting was to use *numerology*, meaning:
 - “Lucky number” 00 to 49: preferred
 - 50-79: standard (100%)
 - 80-94: substandard (approx. 200%)
 - 95-99: more substandard (approx. 300%)

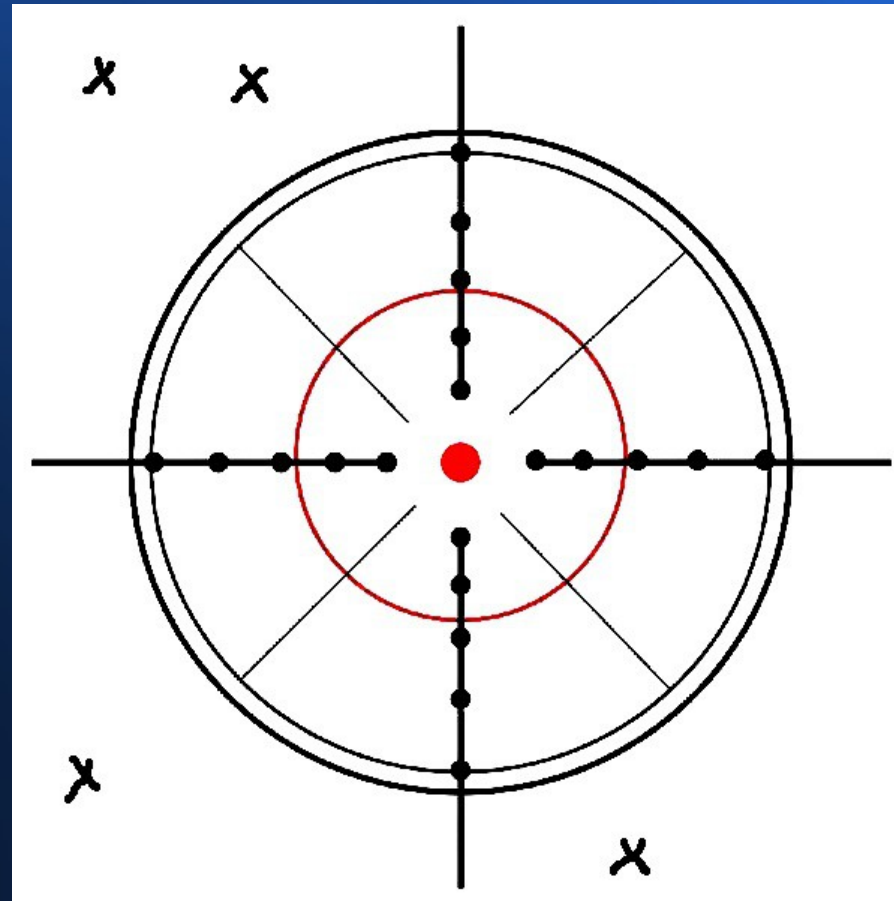
My A-to-E result

100.1001%

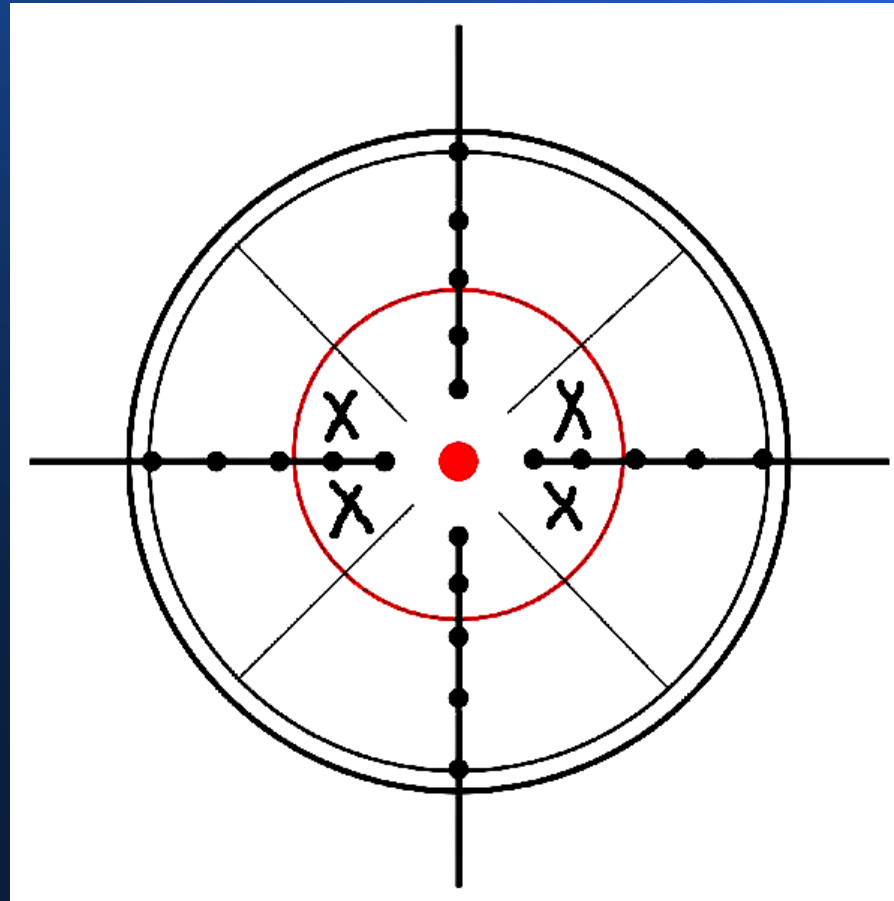
Consider...

- The use of numerology as an underwriting method is clearly absurd
- But how does it produce such a good-looking result?
- Moreover, if a number of underwriters, all using different methods and coming up with different assessments, are around 100% A-to-E, how meaningful is an A-to-E ratio?

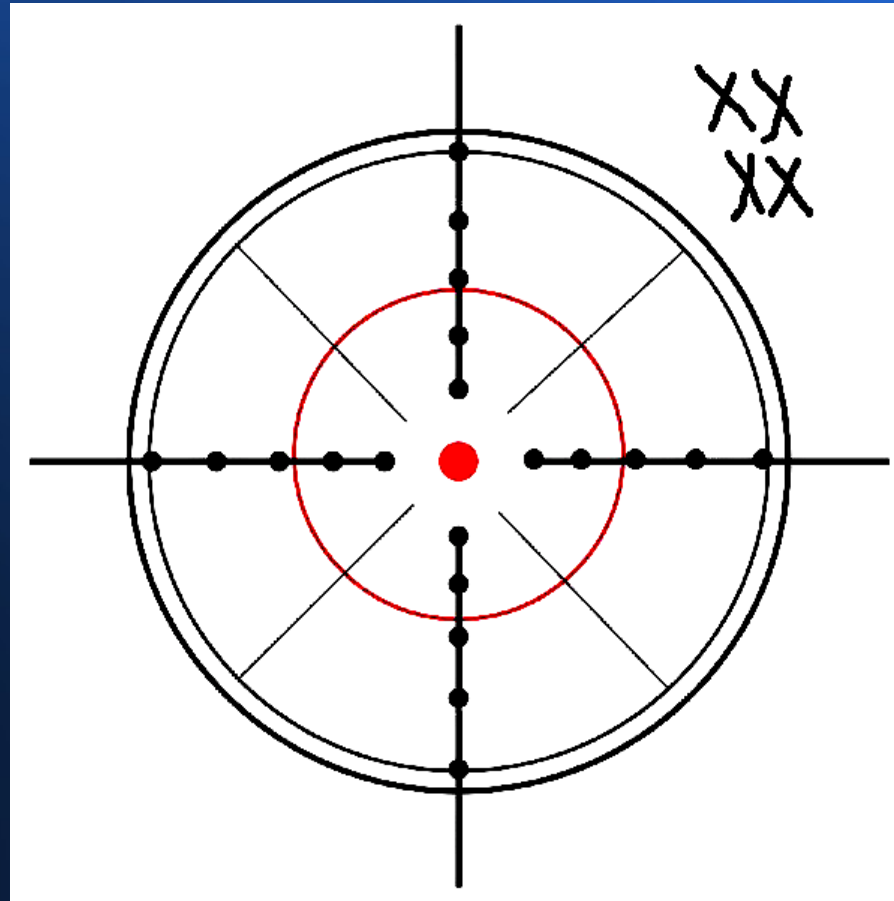
Accuracy vs. Precision: Below Results are Neither Accurate nor Precise



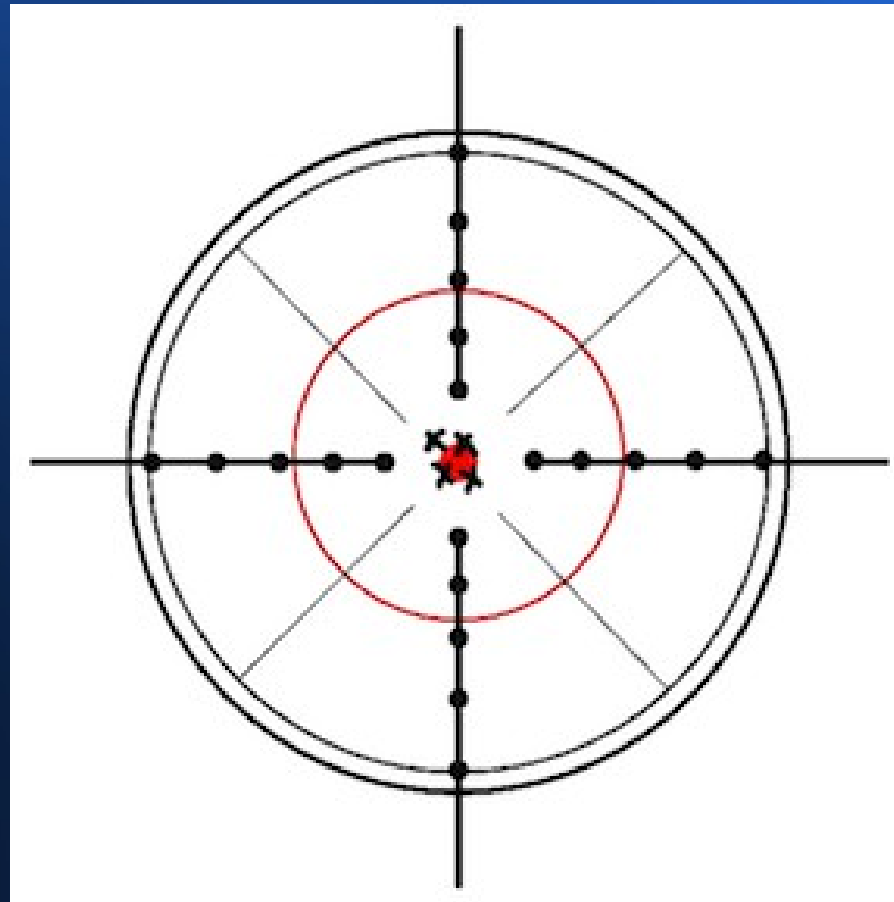
Accuracy vs. Precision: Below Results are Accurate but not Precise



Accuracy vs. Precision: Below Results are Precise but not Accurate



Accuracy vs. Precision: Below Results are Accurate and Precise



Correcting for Inaccuracy / Lack of Precision

- Inaccuracy, as we defined it, is corrected by **AVERAGING**
 - If you sleep with your head in the oven and feet in the freezer, on average you are just right
- Lack of precision is corrected by **CALIBRATING**

Overall Accuracy, but no Precision in My Method

Category	Weight	Exposure-yrs.	Actual Deaths	Expected Deaths	
Preferred	50%	25,000	1250	622.50	200.8%
100%	30%	15,000	750	750.00	100.0%
200%	15%	7,500	375	750.00	50.0%
300%	<u>5%</u>	<u>2,500</u>	<u>125</u>	<u>375.00</u>	<u>33.3%</u>
	100%	50,000	2,500	2,497.50	100.1001%

The A-to-E Ratio

- The A-to-E ratio can tell you about *accuracy*, as we've defined it, but perhaps not *precision*
- My method of numerology was accurate, but not precise

Some data to obtain from the underwriters

- What has been the *actual* mortality result for cases rated “standard”?
- What has been the *actual* result for cases rated 200%?
- Etc.
- By “actual result”, we mean the experienced mortality rates (by age, duration, gender, etc.), not the A-to-E ratio

Analogy to Bond Buying

- When you buy bonds, you want to know:
 - What is the likely default rate for my A-rated bonds?
 - For my BBB-rated bonds?
 - For my BB-rated bonds?
 - And so on...
- A life settlement underwriter is similar to a bond rating agency

Another consideration

- An A-to-E ratio may be based on all cases underwritten
 - But how many of these cases became life settlements?
 - If only a small fraction became life settlements, is the data set truly representative?
- Do “standard” cases become life settlements with the same likelihood as “substandard” cases?
 - If not, what does that tell us about the A-to-E ratio?

Something to think about

- Your portfolio is likely to perform worse than projected, regardless of the quality of the underwriter
- Let's define
 - “M” to be the true and correct mortality rating, which no one knows; and
 - “m” to be the underwriter's assessment of M

Trichotomy Law in Mathematics

- One of the following must be true:
 - $m > M$ (error type 1)
 - $m < M$ (error type 2)
 - $m = M$ (no error)
- Let's look at each error type separately

Error Type 1: $m > M$

- $m > M$ means the underwriter has rated the case more substandard than the “true” rating
- The policy therefore appears more attractive as a life settlement and is quoted accordingly
- The likelihood of a life settlement taking place is higher than it ought to be, because the quoted price is too high

Error Type 2: $m < M$

- $m < M$ means the underwriter has rated the case less substandard than the “true” rating
- The policy therefore appears less attractive as a life settlement and is quoted accordingly
- The likelihood of a life settlement taking place is lower than it ought to be, because the quoted price is too low

Implications

- When an A-to-E ratio is published, Type 1 and Type 2 errors can offset each other because there is an inherent averaging process
- In your portfolio, Type 1 and Type 2 errors cannot necessarily offset each other. Why?
 - You will own more Type 1 errors than Type 2 errors
 - Recall that a Type 1 error is more likely to become a life settlement

Conclusions

- Recognize the limitations of the A-to-E ratio
 - Bills are paid with actual dollars, so you need a good estimate of actual mortality
 - The ratio is an average across the different underwriting classes
 - The overwhelming majority of cases underwritten never became life settlements
 - Various errors might be offsetting each other

Conclusions (cont'd)

- Try to obtain actual results by underwriting classification
- Recognize that your portfolio will likely perform worse than projected, because of the Type 1 and Type 2 errors