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Post-Level Term Mortality Expectations per Dukes-MacDonald

By Michael Parker

Life insurance companies have taken a new look at setting premium rates on their term products during the so-called post-level term (PLT) period. This is because new theories have emerged that suggest setting PLT premiums at lower levels might in fact drive higher profitability as a result of more favorable persistency.

To quantify this phenomenon, many companies have adopted the Dukes-MacDonald (DMD) method, a calculation that predicts how anti-selective lapsation affects expected mortality.

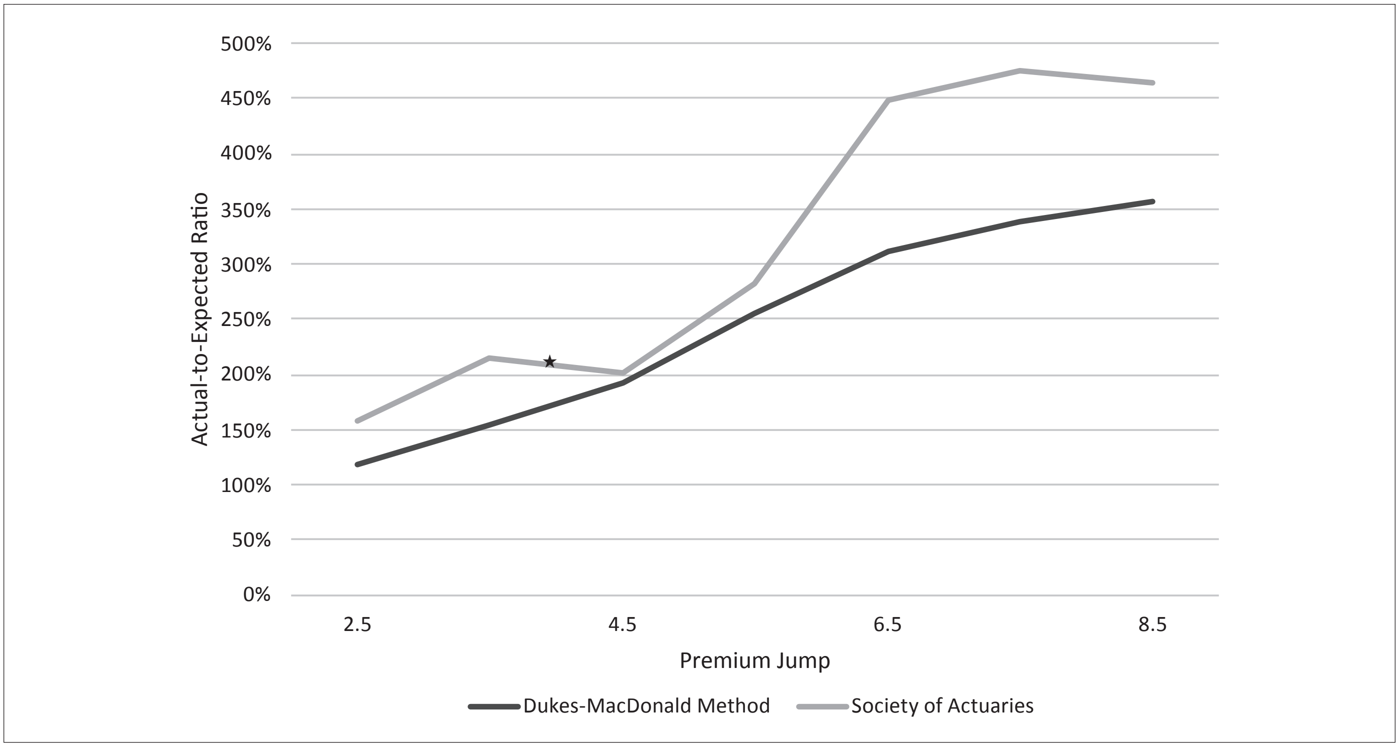
In this article, I compare first PLT year mortality levels predicted by the DMD method to the mortality experience realized according to the SOA-sponsored publication *Report on the Lapse and Mortality Experience of Post-Level Premium Period Plans (2014)*. This comparison leads to several important observations about the use of Dukes-MacDonald (Figure 1, next page).

Of course, the results shown in Figure 1 reflect certain choices regarding the DMD calculation (95 percent efficiency, 10 percent base lapse rate, DMD Option II—excess efficiency deaths spread across persisting block and "inefficient" lapsers). But understand that these choices were made in an attempt to generate an *ordinary* scenario, one that is representative of a typical insured and reasonable implementation of DMD. Also note that the calculation was executed in accordance with ALFA, one of the industry's most commonly used pricing software packages.

This comparison leads to several key observations:

- Companies using DMD calculations and parameters like those used in this article may underpredict first-year PLT mortality compared with industry experience, potentially by a significant margin. Note that for some premium jump sizes in our example, experienced mortality was more than 40 percent higher than that predicted by Dukes-MacDonald.
- To forecast appropriate mortality levels, the key DMD parameters need to be chosen deliberately to generate an intended mortality level. A passive reliance on "reasonable" assumptions could lead to material mortality misstatement.
- DMD parameters that correctly forecast mortality for one premium jump size may not correctly forecast mortality at other premium jump sizes. This makes intuitive sense because DMD fundamentally hinges on an assumption about the "selectness" of lapsing lives, and it is *not* possible

Figure 1
Comparison of First-Year Post-Level Term Mortality Forecast by the Dukes-MacDonald Method* and Industry Experience for a Representative Case**



* 10 percent base lapse rate. 95 percent efficiency. Excess "efficiency" deaths spread across persisting block and "inefficient" lapsers. Shock lapse rates by premium jump size come from Society of Actuaries, *Report on the Lapse and Mortality Experience of Post-Level Premium Period Plans (2014)* (2.5–30.6 percent, 3.5–52.4 percent, 4.5–65.1 percent, 5.5–76.4 percent, 6.5–82 percent, 7.5–84 percent, 8.5–85.2 percent).

** 10-year term policy, male nonsmoker, age 45 preferred. Point-in-scale q = 1.50/1,000. Select q = 0.50/1,000.

★ Note the decline in the SOA mortality actual-to-expected ratio circa a jump of 4.5–5.5 times the premium. This feature of the data may correctly reflect the relative *in*efficiency of incremental policyholders reacting to premium increases of this midrange size. It could make sense that policies that lapse in reaction to small premium increases will be very healthy and therefore very efficient regarding their decision to lapse, while persisting policies at the opposite end of the spectrum *not* lapsing in the face of very large premium jumps will be very *un*healthy and therefore will also be very efficient. It is the policies in between that will be more uncertain of their health and therefore less efficient.

that lapsing lives could have the same mortality expectation regardless of how large the lapsing block is. This seemingly obvious assertion leads to an interesting conclusion: that DMD parameters, particularly the efficiency rate, should be viewed as *variables* across premium jump level sizes, not constants.

This final observation will be particularly important in circumstances in which different-sized premium jumps are being considered—for example, in an instance where a single product includes a variety of different premium jump sizes for different ages, classes, sexes and so on, or during a PLT rate-setting exercise in which a variety of different premium jump strategies are being considered.

In conclusion, Dukes-MacDonald is an excellent tool for predicting anti-selective mortality, but it needs to be used carefully. Its parameters should be calibrated so that DMD produces results that match experience data, whether industry data or company data. And if a broad variety of premium jump sizes are being considered, the parameters may need to be conceived as variables rather than constants so that they will yield valid results across a broad range of scenarios. ■

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