

## Using Predictive Modeling in Group Insurance

JIM RATHBURN AND JEFF SCHUH

**A**lbert Einstein once said, “Know where to find the information and how to use it—that’s the secret of success.” His statement is particularly applicable to the insurance industry’s development and use of predictive modeling (PM).

PM is best defined as a process by which current or historical data are used to create predictions about future events or behaviors. Predictive modeling is a process, not a product. Predictions are created through the use of sophisticated statistical models. Models commonly try to predict the probability of future outcomes such as events or behaviors. Good data—variables and outcomes—are vital to the creation of a meaningful model.

### EXAMPLES OF PREDICTIVE MODELS

PM is everywhere. There are various free apps that illustrate the basics of PM. One app, for example, allows a couple to determine the probability that they will still be married at given anniversaries. To create these predictions, various data items are required, such as:

- Age at time of marriage;
- Combined years of post-high school education;
- Number of children in the marriage;
- Number of children prior to the marriage;
- How religious the couple is;
- Combined prior marriages; and
- Anniversary years for which to calculate the probability.

Businesses other than insurance use PM regularly. Sports teams use these models to predict attendance for games. In an effort to retain customers, Netflix uses many elaborate models to predict the movies your family will enjoy and make recommendations. Charities and universities use models to predict which individuals are likely to be the largest donors.

McDonald’s and Walmart also use predictive models to determine locations where future restaurants or stores are likely to be successful. Airlines are currently building models in an effort to optimize the flight experience and the fees collected from their passengers.

### PM IN THE INSURANCE INDUSTRY

In the insurance industry, property and casualty insurers have been using PM for several years. Recent studies show that 85 percent of personal auto or homeowner carriers use PM in some capacity. As an example, whether it is from independent statistics or mining their own claims experience, these carriers have developed models that can predict the probability of claims based on the characteristics of the insured applying for coverage. This allows them to price and underwrite the product to maximize efficient pricing and minimize experience out of the norm.

Insurance carriers can use PM beyond rating and underwriting. For example, it has been successfully used in marketing to predict buying patterns (not unlike the Netflix example above), which in turn allows for optimal targeted marketing and customized product development.

Adoption by the individual life insurance industry has been slower. A recent study by the Society of Actuaries found that half the companies surveyed were “considering” PM for underwriting. Several challenges still exist: ready access to needed data, customer expectations for appropriate use of data, and the level of resources needed to develop reliable models and change the carrier mindset.

Examples of life insurance industry PM activity include:

- Large multi-line companies using their databases to cross-sell to existing customers and increase penetration rates;
- Direct carriers using models to increase the efficiency of their marketing campaigns; and
- Medical labs using scoring algorithms to assess the relative risk of an applicant.

### CHALLENGES IN GROUP INSURANCE

Predictive modeling can also be used in the group insurance business. Although it has been slow to gain ground, there has been some progress in the area of disability and health insurance. Attempts to use motor vehicle records (MVRs), prescription history,

and other internal or external data sources to predict claims costs have also been made. However, there are challenges:

- *Data.* Group insurance carriers do not have the same level of individual data—such as medical data, prescription history, smoker/non-smoker status, or medical information bureau (MIB) info—readily available that retail insurers have, and any seriatim exposure data obtained during the proposal or renewal process often is not efficiently captured for later analysis.
- *Group size.* It may not be pragmatic for a group underwriter to cross-reference every census against an external source. This is especially true for carriers that focus on small groups. Accessing external data for each quote would slow the process down and add cost.
- *Inertia.* The resources and expertise required for predictive modeling can be daunting to those new to the process. There can also be a feeling of “status quo works just fine,” given the prevalence of experience rating (which inherently modifies the manual rates to account for group-specific differences) and the ability to re-rate every 12 to 24 months.

Group long-term disability (LTD) is the first place that PM has begun to gain a foothold in employee benefits. The application of PM techniques to this product can take several forms and functions:

- *Claims Management Resources.* A number of group disability insurers have been using PM capabilities to optimize claims management resources, triage

new claims, and help flag short-term disability (STD) claims with a high probability of becoming longer duration claims.

- *Reserves.* PM can be used to fine-tune a group insurer’s claim reserves on early duration claims when recovery rates are high and vary considerably by claim. From an industry perspective, note that the Society of Actuaries’ (SOA) latest group LTD claim termination rate table employed PM for its construction.
- *Pricing.* Various methods have been explored by group disability carriers, with goals ranging from tweaking existing factors to an entire recalculation of base rates. Much of this is driven by the data used for the PM analysis.
  - *External.* Incorporating external data into the PM analysis can be time-consuming and costly. There is not a lot currently being done from this approach but opportunities do exist.
  - *Intra-company.* Companies with medical insurance (clinical) data have been actively exploring the ability to use this data set as a group life or disability predictor. Also, insurers with strong property and casualty businesses are attempting to harness their PM expertise for use in group life.
  - *Data mining.* Often the data being modeled are simply a particular product’s own experience and demographic data. Although this is perhaps the “smallest” part of PM analysis, it is able to go beyond traditional actuarial analysis that focuses on one variable at a time (one-way

analysis) and can look at multiple variables at once to spot correlations and interdependencies.

Similar challenges face PM’s use on group life pricing. Information on various data points that can impact the rate is difficult to obtain and harness, and may not be enough to materially enhance pricing methodology. However, it is still early in the game for group insurers. Many horizons can still be explored, such as using PM techniques with voluntary products, medical underwriting, or newer products that may be more closely linked to prescription history such as critical illness.

## CONCLUSION

The biggest challenges facing life insurers, group or individual, are the lack of adequate data and lack of PM skills. There are free statistical and PM packages that actuaries can download, but without proper training and understanding the results can be confusing or misleading because PM is a combination of computer science and applied statistics. Therefore, there has been a trend to either hire data scientists to complement actuaries or outsource this work to consultants and reinsurers with expertise.

Can any of us predict the evolution of predictive modeling’s use in group insurance? This may be difficult, and will require a mixture of art and science, much like the applications of predictive modeling that are in the market today. 🌟

RGA U.S. Group Reinsurance is located in Minneapolis, MN. Jim Rathburn leads the Group Life, Accident and LTD Reinsurance team. Jeff Schuh is the lead actuary for the Group LTD and CI reinsurance team.