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Rob is a frequent industry speaker on predictive modeling, commercial lines ratemaking, captive insurance and medical malpractice topics.

In the area of predictive modeling, Rob has been involved in:

- Ratemaking analyses including implementation of rate relativities and underwriting scorecards;

- Claims studies and utilization reviews;

- Agency management analyses;

- Evaluations of experience and schedule rating plans;

- Analyses of closed claim databases; and

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Underwriting Power Tools for Small Business Insurance

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Commercial lines insurers are moving faster than ever to develop sophisticated underwriting tools for their small business insurance programs.

One of the most popular innovations is an underwriting scorecard that quantifies the impact of a variety of factors into the rating process. By providing greater pricing accuracy, scorecards offer advantages including more accurate risk pricing, better loss ratios, targeted marketing opportunities and lower underwriting expenses.

Insurers are able to determine more accurate "walk-away" prices using the additional price points created by underwriting scorecards. Factors that emphasize characteristics of the company being insured are proving to be particularly valuable because they have not been used much in rating plans despite their predictive value.

Scorecards are demonstrating tremendous pricing leverage by incorporating factors not contemplated in small business insurance rating plans. One leading insurer has introduced a new underwriting scorecard with a highest pricing tier almost five-and-a-half times the lowest tier, which was impossible before. This new approach also allows more accurate assessment of the loss potential of each risk.

Modeling Matters

Since the mid-1990s, leading providers of personal lines insurance have demonstrated that sustained, profitable growth can be produced using predictive analytics.

In fact, three of the most innovative companies used predictive modeling in personal auto insurance to grow market share from less than 20% to more than 25%. They achieved faster-than-average growth while consistently producing loss ratios below industry averages.

How did they accomplish this feat? Leading personal lines insurers have improved the predictive accuracy of their premiums by:

- Rethinking current rating factors, such as territory, driver age or protection class and considering their impact by peril;

- Adding new rating factors, such as credit or number of persons in the household, with an emphasis on insured characteristics; and

- Better coordination of rating factors and tiering guidelines to better predict loss experience.

In more recent years, small business insurers have also been able to "skim the cream." Five leading small business insurers that apply predictive analytics have outperformed the industry loss ratio by 5.5 points since 2000 and are growing premiums at a faster rate than the industry. Three of these organizations have had annual premium growth in excess of 10% annually!

What are Scorecards?

Underwriting scorecards are comparable to credit scores in that a number of variables are combined to create a single metric that measures the predictive power of all variables combined. They are often developed from the same predictive modeling process used to enhance rating plans. This ensures that rating factors and tiering guidelines work in tandem to create a more accurate premium.

The scorecard approach can also be ideal for rating variables related to other factors. For example, the number of stories a building has impacts premiums for habitational risks differently than other industries.

The scorecard approach also works well for those factors with small, but meaningful, predictive value (e.g. responsibility for a parking lot). Scorecards allow rating characteristics -- alone or in combination -- to contribute points to an overall underwriting score. The total number of points a risk earns results in the assignment of a pricing tier and a rate modification factor.

The opportunity for small business insurers to improve the predictive accuracy of their rating plans follows a road map similar to that of personal lines insurers. This includes,

- Rethinking current rating factors - territory, protection class and industry class - often on a by-peril basis;

- Adding new rating factors, such as credit and years in business, based on insured characteristics; and

- Better coordination of rating factors and tiering guidelines.

Sharpening the Pencil

Tremendous opportunities exist to enhance small business rating plans. Rating factors, such as territory, class, insurance curves, protection and construction, can be refined. One such refinement used by Insurance Services Office (ISO) and several insurers is substituting composite rating for developing rates on a by-peril basis, which results in greater rating precision. Consider the variability in class relativities for a leading small business insurer for classes that ISO's BOP product once rated identically.

Figure 1 shows that the insurer will rate department stores about 70% above their base class and auto parts stores

well below the base class. This enables the insurer to write department stores at a more accurate and profitable premium. These more sophisticated rates also allow insurers to increase their hit ratio and decrease their reliance on discretionary credits when insuring auto parts stores.

This is only the beginning. Even greater opportunities for enhanced pricing sophistication and accuracy are possible through underwriting scorecards and tiering programs.

Data Availability

There are a tremendous number of characteristics being incorporated into small business underwriting scorecards. Creative research teams continue to push the envelope searching for new factors and data vendors are striving to meet their needs.

The policy application is a major source of scorecard factors. Insureds submit valuable information that has not been incorporated into the rating process. Factors in this category include:

- Years in business
- Entity type
- Billing/payment plan
- Hours of operation
- Year built
- Type of alarm
- Number of stories

Several of these factors focus on the insured's operations. Additional factors include whether the insured has responsibility for the parking lot, whether it is a franchisee and where it is located (mall, strip center, attached to habitational, stand alone, etc).

Many insurers with large premium concentrations in niches are looking at data specific to those industries. For example, apartment insurers are looking at factors such as tenant turnover rates and CLUE reports to identify the types of tenant claims.

| FIGURE 1 | **Differentiation Using Predictive Modeling** |

Case Description	Building Rate Relativity	Contents Rate Relativity
Art & Hobby Supply	0.471	0.762
Auto Parts Stores	0.336	0.713
Bed & Bath Stores	1.746	1.247
Book Stores	0.801	0.758
Candy & Confectionery Stores	1.406	0.773
Department Stores	1.751	1.683

There is also a strong move toward greater incorporation of credit information into small business insurance ratings. Commercial credit scores create practical concerns for small businesses due to the number of "no hits" and thin files that occur. Credit score developers have responded by complementing commercial credit information with the personal credit information of the insured's principal owner(s).

This blended approach has increased small business credit score hit rates. In some cases, particularly when dealing with very small insureds, such as contractors with fewer than five employees, insurers are only using personal credit scores of the owner(s). In this situation, an underwriter is most interested in the financial wherewithal of the owner anyway.

Some small business insurers are utilizing data contained within the credit scores instead of the scores themselves. These data include:

- Length of credit history
- Number of trades
- Total and overdue balance of all trades
- Number of public records/collections
- Bankruptcies

How is a Scorecard Developed?

When developing an underwriting scorecard, it is important to recognize that many elements of a company's rating plan (e.g. class) may interact with factors included in a scorecard (e.g. years in business or credit score). Therefore, it is best to develop a single predictive model that examines factors for the scorecard and the rating plan together.

Scaling selected premium relativities into a scorecard is generally a straight-forward algebraic process. The key is rescaling multiplicative relativities into additive scorecard points should not change the indicated pricing differentiation of the variables. Scaling makes the results more intuitive, explainable, aesthetically pleasing and possibly more difficult for competitors to duplicate.

Scorecards have been developed in several different ways to achieve this intuitive feel. Some scorecards use a 100% scale and "grade" ranges similar to school grades. Others are modified to replicate the scale of credit scores with a 300-850 range. Still others are scaled so points increase premiums similar to driver motor vehicle records.

Assume a predictive model with several factors is being incorporated into an underwriting scorecard. Once the maximum score desired in the scorecard and the total premium

FIGURE 2 **Example of a Credit Score Factor Scaled into a Scorecard**

Credit Score	Indicated Relativity	Scaling Factor	Score Points
(1)	(2)	(3)	(4)
Superior	0.923	(0.080)	70
Acceptable	0.984	(0.016)	50
No Score	1.046	0.045	30
Marginal	1.087	0.083	15
Unacceptable	1.143	0.133	0
	From predictive model	ln(Col(2))	(3)*Scale Max/E+C

differentiation between the best and worst possible scores are known, each factor can be scaled into the scorecard. Figure 2 shows how one factor, in this case credit score, is scaled into a scorecard. The constants C and E are used to ensure that the overall maximum number of points in the scorecard is met and that the highest indicated premium category (e.g. unacceptable credit scores) receives zero points.

Once each factor has been scored, the overall scorecard tier factors are computed to produce a table of tiering factors (see Figure 3).

Implementing a Scorecard

When implementing an underwriting scorecard, the first group of decisions relate to product development and how scorecard results are incorporated into the existing product. Frequently asked questions are:

FIGURE 3

Tiering Factors

Total Points	Tiering Factor
801-850	0.47
751-800	0.54
701-750	0.63
651-700	0.74
601-650	0.86
551-600	1.00
501-550	1.17
451-500	1.36
401-450	1.58
351-400	1.84
301-350	2.15

- Is the tiering factor that results from a scorecard mandatory or an advisory guideline?
- Can the tiering factor be achieved using company deviations and individual risk premium modification (IRPM)?
- Can the scorecard and tiering be accomplished through underwriting guidelines? If not, will the scorecard have to be filed as a rating plan?
- How can the competitive advantage achieved with the scorecard best be preserved?
- How are large premium changes for renewals handled?

Once the product development decisions have been made, then several logistical issues need to be addressed.

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The main issues relate to data, how it flows and how it is captured. Some of the questions that need to be addressed are:

- How does data flow into the scoring algorithm?
- Where does the scoring algorithm reside (in the policy rating software or as a separate process)?
- How do the tiering factors get incorporated into the rating engine?
- What data capture is needed to provide feedback and monitoring tools to underwriters, product managers, agents and insureds?
- What additional factors not in the current scorecard need to be captured for future use?

It is interesting to note that a major small business insurer took this approach to credit. They chose to capture the credit data, but did not use it for tiering…yet.

Opportunities Abound

Insurers that develop refined rating plans and underwriting scorecards to create competitive price advantages are also creating additional opportunities.

Insurers that know several factors to effectively pre-screen superior risks in a target class also have a tremendous marketing opportunity. They know their scorecard will lead to more competitive pricing and a higher-than-average success ratio on new business quotes.

Another opportunity exists to purchase marketing lists of companies that meet the scorecard criteria and are close to the insurer's agents. This will lead to new business for the agency and profitable growth for the insurer.

In addition, underwriters can receive more information about the factors influencing premium quotes. Expense ratios can

Key Drivers Accelerating Scorecard Development

- Technology Advancements - Greater computer processing power and storage enables insurers to create complex data warehouses, perform sophisticated modeling, and implement sophisticated rating plans.
- Operating Efficiency - Softening market conditions are leading to greater pressure to improve the efficiency of underwriting small business risks.
- Market Dynamics - Small business insurance is a growing part of the traditional insurance market as larger risks migrate to alternative markets and insurers expand small business program eligibility.

also decline through achieving higher business hit ratios and focusing underwriting resources on more complex risks. Insureds can benefit from information on controllable factors that impact their premiums.

Conclusion

Underwriting scorecards provide several opportunities for small business insurance programs. By quantifying the impact of several factors into the rating process, scorecards are providing greater pricing accuracy, more accurate risk pricing, better loss ratios, targeted marketing opportunities and lower underwriting expenses. As scorecards evolve from best practice to industry standard, they will continually provide a strategic opportunity for appropriately measuring risk while gaining market share.

Originally published September, 2008

This monograph is the second publication in a three-part series on commercial lines predictive modeling. For more information, contact Robert Walling at (309) 807-2320 or email rwalling@pinnacleactuaries.com.