PROPERTY/CASUALTY INSURANCE

PRICE OPTIMIZATION FOR INNOVATIVE INSURERS

Sophisticated risk-based pricing models and market analysis are no longer enough to produce a competitive advantage. Tomorrow's market leaders will be those quickest to adopt new price optimization techniques that are on the way.

By Mark Airey and José Moreno Codina

In today's marketplace, product pricing and responding to competitive forces are widely recognized as the most important challenges facing personal lines insurers. Price optimization approaches, which balance profit and sales volume while applying customer behavior and competitive analysis, are now being used by the financial services industry for long-term value creation — and becoming increasingly relevant to personal lines insurance.

This is an inevitable next step in the trend toward better use of pricing and price monitoring technology in insurance. Indeed, epochal changes in pricing sophistication have been under way for some time, dating back to the broader use of multivariate analysis in the U.S. and Europe in the 1980s and 1990s (*Emphasis* 2005/1, Knowledge and Courage — The Keys to Success"). Use of more complex pricing systems in turn required comparable price monitoring systems (*Emphasis* 2006/3, "Price Monitoring: New Ways for New Needs").

Today, understanding competitive position requires cluster analysis to develop segmented pricing strategies allowing consideration of competitive pricing intensity along with loss trends (*Emphasis* 2007/2, "Competitive Market Analysis in Personal Lines"). Competitive market analysis (CMA) has evolved as insurers adapted to growing price complexity and now offers important benefits, along with challenges to effective implementation (see "Overcoming the Challenges of CMA" on page 6).

It is only in recent years, with the development of sophisticated predictive modeling capabilities, that a broad spectrum of industries has started to move away from pure cost-based pricing and pay attention to the demand side. Among other obstacles, understanding how customers respond to price changes is fiendishly difficult and, until recently, the data crunching and econometric modeling capabilities it demands simply haven't been widely available. But now, demand-side pricing techniques have begun to spread from the industries that originated these practices — hotels and airlines — to other industries, such as retail, auto, telecommunications and financial services.

A number of insurers in Europe and the U.S. have been using these advanced statistical modeling techniques to improve their risk assessment and selection by integrating various characteristics that differentiate their customers into rating and underwriting segments. Using predictive models that relate a broad set of customer attributes to claim propensity, the most innovative companies have been able to:

- identify customers with below-average claim propensity in a given rating class and target their marketing toward those customers
- implement preferred underwriting program tiers that offer discounts to those with below-average claim propensity
- implement nonstandard underwriting programs that offer coverage "at the right price" to customers who would otherwise be deemed unacceptable.

PRICE OPTIMIZATION — THE QUIET REVOLUTION

While more sophisticated pricing models have provided competitive advantage for the companies that use them, they are fundamentally a cost-plus approach. CMA, along with other approaches to competitive and customer analysis, provide added market dynamics to price selection. Price optimization is the next destination in the pricing revolution.

Price optimization is the integration of demand-side pricing (a customer's willingness to pay) into an overall pricing strategy. There are three components of a comprehensive price optimization program that promote a better understanding of customers and markets.

- **Claim propensity models** express how customer attributes are predictive of their loss probability. These models are used to develop new rating plans or customer scoring systems for underwriting, reclassify existing underwriting factors or identify new underwriting factors. The aim is to have a realistic representation of the cost expected for each policy whether or not it is used to construct a tariff structure.

These are based on multivariate statistical models such as generalized linear models. The objective is the determination of a statistical model able to explain a significant part of the variability of the analyzed portfolio and to propose a price factor relativity structure based on the company experience.

- **Market situation models** express how the company's competitive position and the market's competitive intensity vary by

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segment or niche within the market. This involves obtaining premium rates charged by an insurer's competitors for as many risks and competitors as possible to produce a picture of market premium rate levels that provide insight into market behavior (market direction, key competition and new products). It is performed using one-way or multi-way benchmarking to identify the competitors by segment.

■ **Customer behavior models** express how the customer's attributes and the market's situation are predictive of the customer's behavior, for example, the response rate or lapse rate.

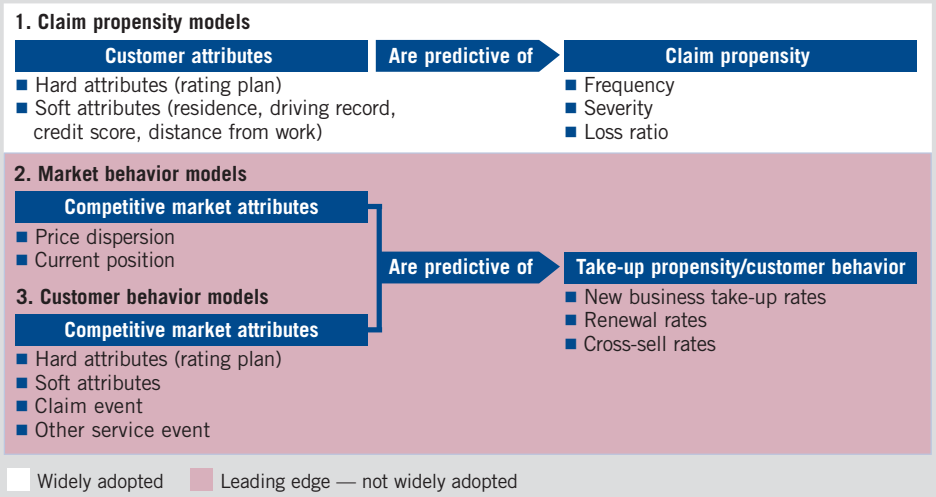
All three of these modeling techniques are essential building blocks of price optimization and are used to predict the effect of tariff changes on profitability and volume in order to identify the best prices for a given financial objective and relevant constraints (see *Exhibit 1*).

Effective price optimization ultimately seeks to provide an insurer with the tools necessary to increase or decrease premium prices based on a combination of marketplace variables, including (but not limited to) product demand, certain customer characteristics and the competitive landscape, along with underlying loss trends.

The adoption of price optimization techniques in the insurance industry over the next few years will amount to a quiet revolution as innovative insurers gradually introduce demand-side aspects to their sophisticated customer-scoring models at an increasingly granular level.

EXHIBIT 1

Three types of predictive models support price optimization



These methods will rely on an in-depth understanding of the specific markets in which these insurers operate, customer buying behavior and claim propensity, and, ultimately, how a range of variables interact to increase or decrease customer purchase rates and market share. As these changes are integrated into the market landscape, there will be a truly revolutionary realignment within the industry. New winners will emerge, and those that don't adapt will find themselves at a distinct disadvantage as they experience adverse selection and the resulting erosion of margins. One result is that we expect to see a wider variation in combined ratios among companies over the next few years.

To get to that position, insurers need to develop and integrate the three basic price optimization tools — claim propensity models, market situation models and customer behavior models. The first two of these have been discussed in prior *Emphasis* articles; customer behavior models and the integration of the basic tools are the subject of the remainder of this article.

CUSTOMER BEHAVIOR

Successful customer behavior models help companies understand how current customers will react to price changes at renewal and how price levels will affect new business development. By developing models of customer responses to discounting, marketing campaigns, competitive activity and other pricing or service events, insurers can gain a comprehensive picture of customer preferences. As companies begin to apply these techniques, it is important for them to understand clearly how the analysis results should be used to adjust pricing strategies.

Price optimization is the next destination in the pricing revolution.

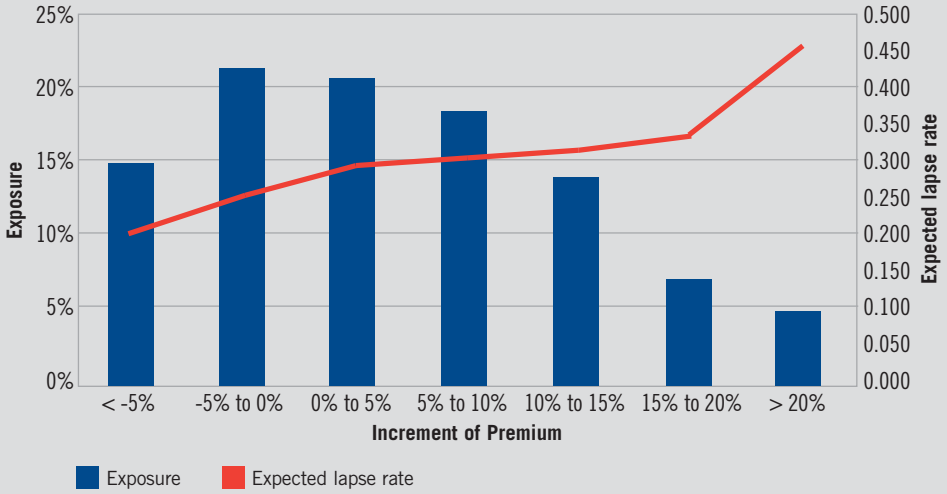
The price elasticity, or demand function, takes into account different variables that previously have not been widely analyzed, including the history of price variations, brand strength and awareness, distribution channel and other significant factors. The result of this modeling produces a scoring algorithm to predict conversion or retention rates for price relative to price changes and the competition. In some cases, both rates can be predicted.

Exhibit 2 shows how the lapse rate (red line) is estimated to change, assuming different movement in prices from one year to the next.

The most effective way to generate a price elasticity curve is to vary prices and measure the impact on volume. In some countries, insurers can use controlled testing of rates to generate demand curves. By replicating the rate structure and marketing to one group of customers through parallel testing of multiple sets of rates, the impact on volume as prices change can be measured. This kind of testing helps measure conversion and retention rates by price.

Where parallel controlled testing is not appropriate, multivariate techniques drawn from historical data can be used to develop models explaining the likelihood of retention as a function of price change and customer characteristics. Models may also include the relativity to competitors' price. And because new customers are generally more sensitive to price than renewal customers, it is critical to model the two groups separately to understand the probability of converting new policy quotes.

EXHIBIT 2
Elasticity of demand measures' response to price changes



BRINGING IT ALL TOGETHER

The final step and culmination of this work is to develop an optimized pricing structure that maximizes the objectives of the company, subject to business and strategic constraints. Alternative variables can be selected to be maximized or minimized. The most commonly used ones are expected profit and number of policies.

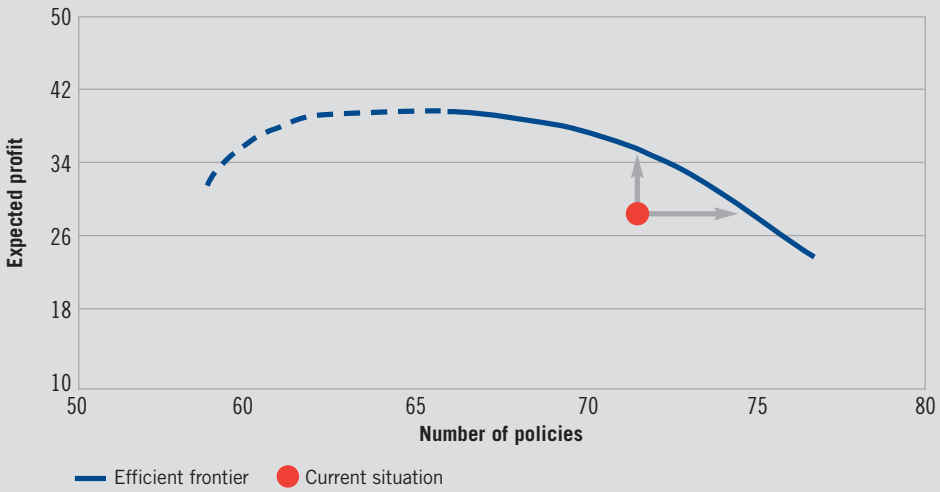
For example, suppose you decide to maximize the expected profit. It will be defined as the difference between the final premium and the risk premium multiplied by the probability of renewal, where each of these three functions is the result of previous steps in the optimization process.

The process must incorporate real-world constraints, such as the necessity to write business in certain locations or through certain distribution channels. Moreover, the final premium could be subject to regulatory constraints in some countries.

A company's preference for market share over short-term profitability may shift over time. It may decide to aggressively increase market share when the market is strong in order to benefit from a hardening or, when facing capacity constraints, it may wish to focus only on its most profitable customers. With price optimization techniques, a company can leverage sophisticated analytical methods to clarify strategic direction in pricing strategy and react quickly to new patterns in data as they are uncovered. By integrating the three components of price optimization — claim propensity models, market situation models and customer behavior models — companies can more confidently meet particular profit objectives or change prices to meet market-share targets, while understanding the profit implications of doing so.

Expertise in price optimization will become a core competency of all insurers in the market.

EXHIBIT 3
Moving to the efficient frontier maximizes profit (illustrative)
Expected profit efficient frontier



The overarching objective is to move a company closer to the efficient frontier that represents maximum profit for each particular volume of business. The efficient frontier is the portfolio of risks that maximizes the expected profit for each volume of business (or number of policies). Alternatively, for a given level of profitability, the efficient frontier is the portfolio of risks that maximizes the volume of business. To attain a point in the efficient frontier, it's necessary to define the number of policies and then maximize the expected profit for that specific number of policies.

Exhibit 3 shows that the current situation is not optimal and that, for the same expected profit, there is a portfolio of risks that includes a higher volume of policies or that, for the same number of policies, there is a portfolio of risks that would increase the expected profit.

IMPLEMENTING THE PROCESS

Given the complexity of the analyses, price optimization is typically undertaken in phases by iteratively testing price changes against volumes and profitability. Testing is first performed across a small part of the portfolio, and then expanded to more markets and lines of business. The advantage of a phased approach is that it can be used to prove the concept, and tactics can be adjusted according to results. The outcome of each step can help demonstrate improved performance in order to gain further organization buy-in, and the information collected during the first phases can be used to provide input to later phases. Initially, price testing can be used to make iterative improvements to profitability.

In later stages, we combine multivariate models of costs and price elasticity to simulate the relationship between price change at the customer level and overall profitability. Findings can then be used to set prices across the whole portfolio and to better understand the relationship between customers and the tariff structure.

By elevating the output of price optimization techniques into the heart of the company, where key business decisions are made, improved competitive positioning can be expected. The approaches and methodologies highlighted in this article underscore the benefits of bringing together the data, the statistical knowledge and the necessary methodologies.

The information needed for this analysis is different from the data typically maintained by insurers. Although compiling the data may be difficult, it is well worth the effort.

The winners in this arena will find they have powerful tools to help them manage the swings of the insurance cycle. When prices in the market are falling, those with a stronger knowledge of the profitability characteristics of their customers, as well as their price elasticity of demand, will be in a much better position to manage through the downturn. Indeed, as the gap between winners and losers widens, expertise in price optimization will become a core competency of all insurers in the market.

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