

Price Optimization

For New Business Profit and Growth

By Angel Marin and Thomas Bayley

Non-life companies want to maximize profits from new business.
Price optimization can make the difference.

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Introduction

To write more new business, property & casualty companies need to define the type of customer they want to attract and then understand how price-sensitive these customers are to their products. By effectively analyzing price sensitivity and expected sales volumes at varying profit levels, companies can increase new business conversion rates — given target levels of profitability — to arrive at an optimal new business pricing strategy.

Insurance companies have made significant advances in more granular risk-based pricing through the use of predictive modeling techniques. As a result, the spread of new business loss ratios compared with those for renewal business (known as the new business penalty) has been reduced. Predictive modeling has driven this improvement, and companies can now turn their attention to how to increase overall new business profitability.

The process needed to conduct this analysis, called price optimization, was described in a previous article (“Price Optimization for Innovative Insurers,” *Emphasis* 2008/1). We also described how price optimization could be used to improve the retention and profitability of an in-force portfolio (“Price Optimization for Profit and Growth,” *Emphasis* 2008/4). In this article, we show how price optimization methods have also been successfully applied by property & casualty companies to improve new business conversion rates and achieve the desired overall profitability for the portfolio — while working within management and regulatory constraints.

Incorporation of a customer behavior model in the pricing system for new business is fundamental to premium optimization. The improvements made in collecting customer and competitor information, combined with the increase in computing capacity, can help insurers to move from pricing exclusively according to risk attributes toward an integrated pricing approach. Such an approach incorporates competitors’ premiums and customer behavior along with risk attributes in the pricing of new business. Combining these elements should help companies find the most profitable balance between the extremes of low-volume/high-profit sales and low-profit/high-volume sales.

Why Optimize Prices for New Business?

It is easy to write more new business by simply reducing the overall level of premiums. Similarly, a company can increase the per-policy profitability of new business by increasing premiums for a given risk profile. However, neither of these pricing strategies will work in a real insurance market. Balancing growth and profitability is the key to long-term success.

By using price optimization techniques to analyze information about competitors’ price levels and customer behavior related to price levels, companies can find the proper balance between these factors. An optimized pricing system can also help:

- Determine the optimal price within the range of possible prices for every insured
- Adapt the premium based on market competitiveness to attract certain profitable segments of business
- Attract new customers with strong loyalty and increase the potential for cross-selling

Development of the pricing system should consider not only the risk but also the variation of other acquisition costs, customers' sensitivity to product price (elasticity), and the likelihood of their buying other products (cross-selling) or staying longer with the company.

To address these issues, companies need to start by defining a "benefit function" that incorporates the primary elements of product profitability over the required time horizon. The goal of the price optimization process is to find the premium level that will maximize this benefit function. *Figure 1* shows a typical breakdown of this function.

To arrive at a benefit function model, the following items will need to be included:

- **Conversion rate model.** This model estimates the probability of writing a new policy considering the relevant variables related to the customer and market competitiveness.
- **Proposed premium to be offered to the potential insured.** This is what the optimization process essentially solves for. This proposed premium is calculated by taking into account the appropriate probability of discounts such as No

Claims Discount in the U.K. or Bonus-Malus in Continental Europe.

- **Model refinement.** These models are usually refined by incorporating the probability that the policyholder remains with the company over time, and may also take into account extra profit arising from cross-selling and referrals (both of which can be modeled probabilistically).
- **Benefit function.** In particular, this can be modeled using time horizons chosen according to the financial goals of the company. It can be built for a short-term time horizon, such as one year, or for a longer time period of three to five years.
- **Pure premium model.** This can be carried out by modeling frequency and severity separately, or can be done directly through the modeling of loss costs, adjusted for inflation and loss development.
- **Expenses.** All expenses must be considered, including those for acquisition, administration and claim handling (perhaps varying by client profile). Expenses can be modeled both at the portfolio and per-policy levels.

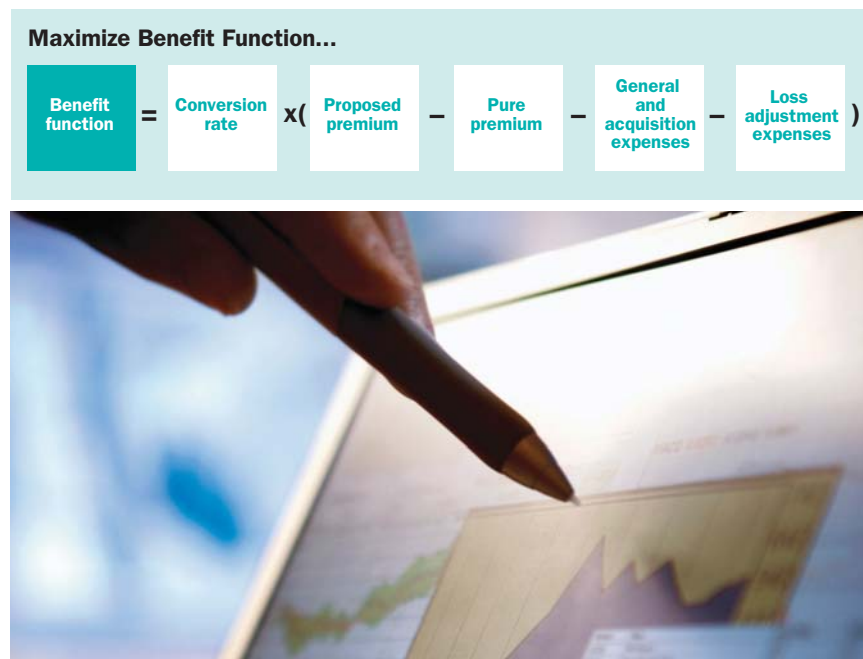


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Figure 1. Structure of a benefit function for new business price optimization



Some of the most important variables used in modeling these components are the classification of agents, driver age, claim history, geographical area or territory, Bonus-Malus system (or equivalent claim discount/surcharge system), and the difference between the offered and the market premium.

Building a Price Optimization Model for New Business

Elasticity of demand is a key ingredient in this process. Each company has its own elasticity-of-demand curve (formed by its potential client profiles, each with its own behavior). The curve is based on an analysis of the relationship between changes in the incremental quantities of policies converted from initial quotations and the price increase or decrease proposed by the company.

To ensure that the model represents current market reality, the internal and external data must be continually tested and upgraded. A model based on market information even just a year old may not accurately reflect current market competitiveness, and its use can lead to unprofitable pricing decisions.

Competitive market analysis (CMA) enables insurers to obtain premium rates for as many risks and competitors as possible (see “Competitive Market Analysis in Personal Lines,” *Emphasis* 2007/2). CMA incorporates the insight and knowledge of general market behavior (market direction, key competition), knowledge of price levels by rating factors, intensity of the competition by segment (measure of price dispersion) and a comparison of the company’s prices against market prices by segment.

“The classic approach, which calculates premiums based solely on loss costs, is not enough to optimize a company’s growth and profits from new business.”

Figure 2. Comparison of discount profitability and conversion rate in a European auto market

Difference in premium offered by the company vs. market premium

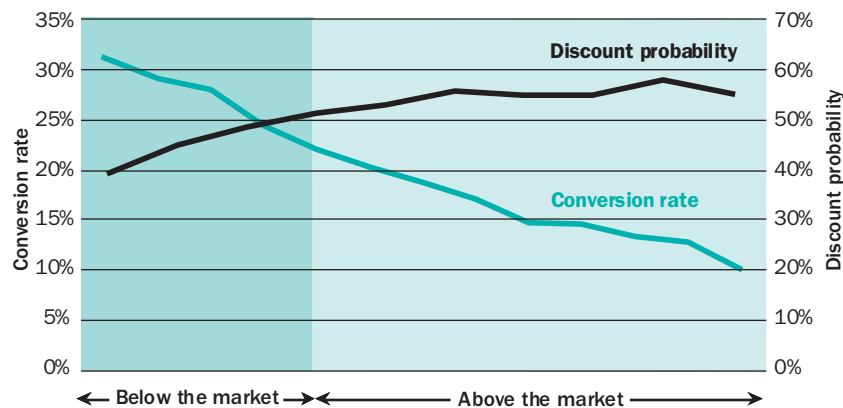


Figure 3. The optimization model

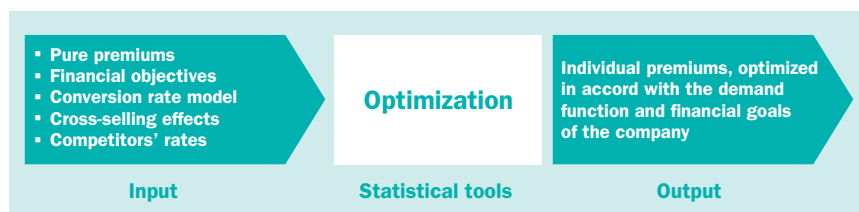


Figure 2 shows a real example from a European auto insurance market that gives policyholders rate discounts for various reasons. The price elasticity model needs to take this discounting into account. The figure shows two direct relationships: first, between the conversion rate and the difference between the premium offered by the company and the market premium for the relevant segment, and second, between the probability of applying discounts to a new policy and the company/market premium differential. It is clear that:

- The lower the premium offered by the company in comparison with the market premium, the higher the conversion rate and vice versa.
- The lower the premium offered by the company in comparison with the market premium, the lower the probability of the client being given a discount.
- The higher the premium offered by the company in comparison with the market premium, the higher the probability of the client being given a discount.

Along with the price elasticity information, other data are needed to build the model, including pure premiums by class of business, financial goals of the insurer, cross-selling information and competitor prices by class.

Figure 3 shows the inputs necessary for the new business optimization model and the outputs that would be generated.

Figure 4 is a schematic of the optimization process for new business. At the start, the company needs to determine the constraint and the target. It is possible to define the total new business revenue and maximize profitability given that revenue or (more commonly) to define the overall new business profitability and maximize new business revenue given that profitability target. The choice between these two approaches is a key management input.

The new business optimization process calls for an appropriate software tool that can jointly analyze all the elasticity-of-demand functions for all potential clients' profiles. With this analysis, the company can determine probabilistically the best combination of conversion rates and types of client, and then produce the desired maximum (the number of new business conversions) given an overall profitability

target. The process may need to incorporate constraints to satisfy any management or regulatory restrictions, which will lead to an adjusted and definitive combination of prices and client profiles.

Results Obtained From the Price Optimization Model

The new business optimization process produces an efficient frontier where, for each conversion rate, there is a combination of policies and prices that produces different profitability levels. However, only one combination of policies and prices will give the maximum profitability for a given overall conversion rate. The graph of the maximum profitability for each overall conversion rate forms an efficient frontier. There are other suboptimal combinations for the same conversion rate level, but the profitability will be lower.

A company might also want to maximize the revenue of new business, maintaining a given level of profitability. In that case, management would determine the overall profitability (in whatever form this is defined) to be achieved by the new business, and the optimization process would produce the combination of client profiles and individual prices to achieve it (i.e., maximum number of new policies or highest possible conversion rate), allowing for any restrictions.

“Balancing growth and profitability is the key to long-term success.”

Figure 4. New business optimization process

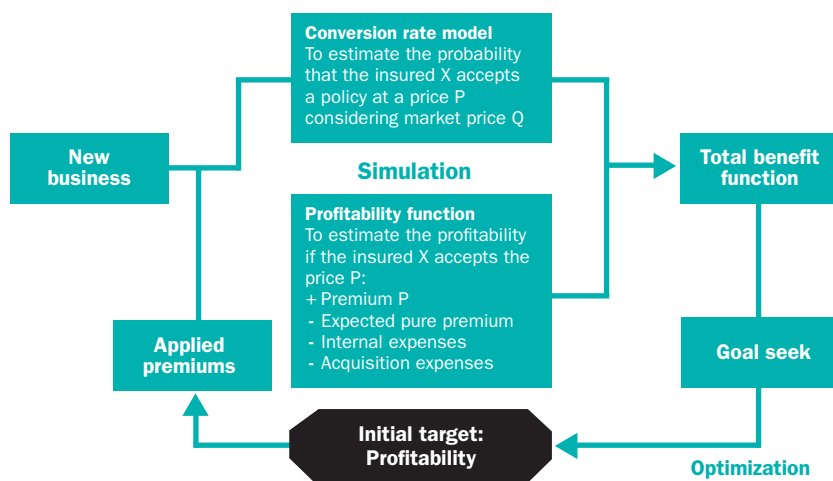


Figure 5 shows an example of an efficient frontier for new business conversion.

- The current Company strategy (red dot) is clearly suboptimal.
- The green dot represents Strategy 1, where the company improves profitability while maintaining the same conversion rate.
- The orange dot represents Strategy 2, where the company improves profitability at a reduced conversion rate.
- The blue dot represents Strategy 3, where the company increases conversion rates while maintaining the same profitability level.

Figure 5. Efficient frontier for new business conversion

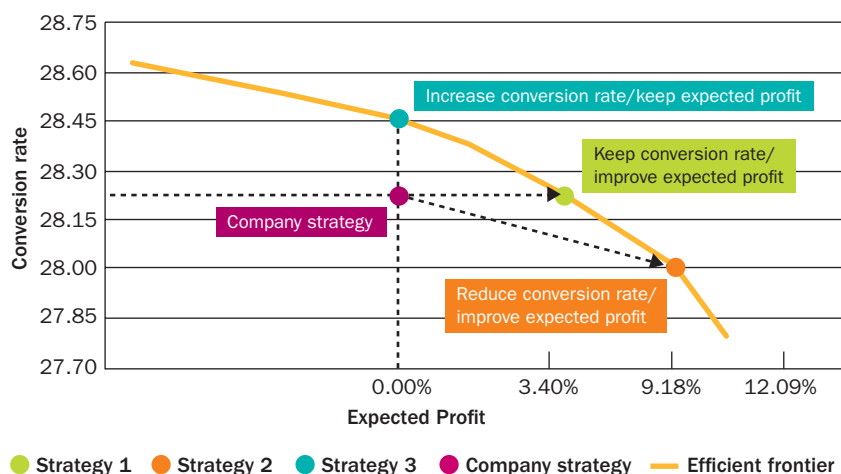


Figure 6. Financial indicators for efficient frontier strategies

Scenarios	Conversion rate	Average premium	Expected profit	Number of policies	Written premiums (thousands)
Company strategy	28.2%	334	0.0%	146,208	48,779
Strategy 1	28.2%	337	3.4%	146,208	49,201
Strategy 2	28.0%	343	9.2%	144,925	49,767
Strategy 3	28.5%	332	0.0%	146,932	48,833

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Implementing Optimized New Business Rates

The optimal price for new business will be the one that satisfies the company's strategic objectives while maximizing profitability, subject to management and regulatory constraints. Optimized rates can be implemented in two different ways:

- As an algorithm that calculates the optimized price per individual customer based on his/her particular rating attributes, which can be built into the rating structure and operate in real time
- As a set of optimized premium rates that would fit into a tabular rating structure

Advantages of Adopting Price Optimization of New Business

The classic approach, which calculates premiums based solely on loss costs, is not enough to optimize a company's growth and profits from new business. The combined analysis of the different indicators that affect profitability allows insurers to reach their financial objectives while maintaining a competitive market position — thereby maintaining flexibility in the face of cyclical changes.

The statistical techniques and models needed for this analysis are available but are not yet widely used, although they are rapidly gaining adherents in different markets. By adopting price optimization early, pioneering companies will capture more of the new business that they desire at profitable rates — and gain significant competitive advantage.

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