

Price Optimization and Regulation
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What is price optimization?

It is an iterative process to adjust the current set of manual rates, with some rates adjusted higher and other rates lower, to achieve specific goals for profit or for growth in premium, within the context of competitive pressures and while meeting regulatory requirements.

Price optimization recognizes that a specific manual rate is a point estimate of a “true rate” and lies within a range of justifiable rates that can probably be defined by a probability distribution.

The iterative process may recognize the current distribution of exposures for each manual rate and that changes to manual rates within a competitive market can have the effect of resulting in a different projected set of exposures. For example, decreasing a certain subset of manual rates may result in projected increases in the exposures written in those cells. The iterative process may also consider how the effect of retention rates will be impacted by a price change in the context of competitors' offers.

The iterative process is carried out by an actuary whose work may be reviewed by regulators; whose work must be in compliance with Actuarial Standards of Practice; and whose work will be tested in a competitive marketplace.

For our discussion purposes, we will suppose that among a current set of manual rates, a specific subset of rates, such as certain classes, or a certain product or line of business, will be adjusted **significantly higher** than currently, while a different subset of rates will be adjusted **significantly lower** than currently. These hypothetical **significant changes** will serve to highlight the effects of price optimization, whose actual effect on rates may be moderate.

The two basic standards of regulators:

- “ --- Rates must not be inadequate, excessive, or unfairly discriminatory
- “ --- Rates must not be so low that solvency is threatened

Other regulatory constraints:

- “ --- rates often may not exceed those charged by a state’s residual market. These residual markets include automobile or workers compensation, as well as FAIR plans, Beach plans, or hurricane pools that usually cover homeowners or commercial property.
- “ --- in credit insurance (broadly including any insurance made in conjunction with a loan or mortgage), many states have either specific maximum rates or specific minimum loss ratios, due to the perception of “reverse competition”
- “ --- some states constrain the variables that may be used for rates (for example, some states do not allow the use of gender, marital status, or age for auto insurance)
- “ --- premium deficiency reserves. If the expected losses and expenses exceed expected premiums, a PDR must be set up under statutory accounting.
- “ --- IRIS ratios and RBC (Risk based capital) ratios

Three key issues for the actuary performing price optimization, in regard to regulatory guidelines are to check that:

- “ Rates, possibly including rating factors, do not exceed that of a state’s residual market. Some states compare the proposed rate to the residual market rate. Other states take a more broad picture approach, requiring that the proposed rate, together with any applicable rating factors, does not exceed the rate that would be charged by the residual market. These states may allow company’s to use factors other than the residual market factors.
- “ Since premium deficiency reserves are often calculated on a high level of aggregation, it’s often unlikely that price optimization would result in requiring a PDR, however it would be prudent to include such a calculation in the price optimization analysis
- “ A re-calculation of risk based capital may be warranted if the proposed changes are thought to be significant enough to affect RBC

What types of lines of business or classes of businesses are well-suited to price optimization?

- ” --- Any mix of a “required” line or class and another line or class that is commonly sold along with the required line or class
- ” --- “required” may be those lines or products that are required by law; or are required by financial institutions in conjunction with a loan; or are required by a landlord

Specific mixes of business that are well suited to price optimization:

- ” --- Auto liability (required by law) and auto physical damage (may be required if there's a loan on the vehicle)
- ” --- Homeowners and mortgage guaranty (may be required by a loan)
- ” --- Auto and homeowners
- ” --- Workers compensation (required by law) and commercial multi-peril
- ” --- Tenants or condo owners or commercial property (may be required by landlord or condominium association)
- ” --- Auto and homeowners in conjunction with life or health insurance

What are some parameters upon which rates can be adjusted?

- ” --- By geographic territory
- ” --- By limit (liability) or by value of property (deductible or limit or vehicle symbol)
- ” --- By class (type of business or employer)
- ” --- By size of insured (for example, by assets, number of employees, revenue, square footage, number of locations, or beds)

- “ How can the rate changes in various classes be effectively marketed to prospective customers? One method is to create an effective strategy for paying contingent commissions.
- “ Regan and Kleffner* discovered that insurers using more contingent commissions show lower loss ratios, along with smaller variation in loss ratios over time. They also discovered that increased use of contingent commissions is associated with lower combined ratios, which indicates that effective use of contingent commissions does not increase expenses. Instead, contingent commissions may incentivize producers in selecting risks more carefully. [*Selected Recommended Reading, page 18].

What can go wrong in price optimization, in relation to achieving target goals for profit or premium growth?

- “ --- under-priced policies in certain classes, can result in so much more business, that results that expect certain renewal rates or new business written penetration rates, fall well short of internal targets for profit or premium growth
- “ --- over-priced policies in certain classes, can result in so much less business, that results that expect certain renewal rates or new business written penetration rates, fall well short of internal targets for profit or premium growth

What can go wrong in price optimization, in relation to regulation?

- “ --- Under-priced policies in certain classes, can attract so much business that the company’s solvency can be threatened, under moderately adverse scenarios
- “ --- Under-priced policies in certain classes, perhaps as a result of desiring to be below competitor’s prices can lead to excessive price cutting, so that the company’s solvency can be threatened, under moderately adverse scenarios
- “ --- Over-priced policies in certain classes, that may exceed the state’s residual market, possibly after combining a base rate with a set of rating factors, can lead to excessive rates that may have to be refunded to consumers along with monetary penalties from regulators. Note that regulators may act on complaints from consumers along with market conduct examinations.

What are some tools to achieve price optimization other than by revising a set of manual rates?

- “ Schedule rating
- “ Dividend philosophy
- “ Adjusting the factors underlying experience rating or retrospective rating plans
- “ Between companies (property & casualty insurers versus life & health insurers within the same company ownership)
- “ Between rate tiers. For example, an policyholder may be offered, at renewal, a rate tier significantly higher or lower than currently

Key philosophical questions from a regulatory view

- “ Is it OK if a set of rates is adequate even if a subset is inadequate? What statistical tests can be used to determine if a rate or set of rates is inadequate?
- “ Is it OK if a set of rates is adequate even if a subset is excessive? What statistical tests can be used to determine if a rate or set of rates is excessive?
- “ What statistical tests can be used to determine if a rate or set of rates is not unfairly discriminatory?

Key insight

- “ Price optimization exploits an informational asymmetry between the company actuary and the regulatory actuary

- “ What is the informational assymetry?

- “ The company actuary:
 - “ --- sees the inputs, the iterative process, and the outputs. The target for profit or premium growth is also known. Scenarios of how competitors may respond can be projected.

- “ The regulatory actuary:
 - “ --- sees only the proposed manual rates; the change from current manual rates; and sometimes the profit target.
 - “ Clearly, the regulatory actuary should inquire about classes where the change is significant. However, how do we define significant? What if the number of insureds in that class is small? How do we define “small”?

Some topics for future research by actuaries performing price optimization

Price elasticity:

- “ To what extent do customers make new applications or renew when premiums increase or decrease?
- “ To what extent do customers make new applications or renew when premiums bear a certain relationship to competitors? Also, how do we define these competitors?
- “ Are there differences in new applications or renewals when premiums are really low (so-called “preferred classes”) versus when premiums are really high (so-called “non-standard classes”)? For example, in private passenger auto insurance, there may be distinct differences in new business & renewal rates, by age, for customers under 25; 26-64; and 65 and over. Let’s talk about that as an instructive hypothetical situation.

Some topics for future research by regulatory actuaries (part one)

- “ Develop specific standards, especially statistical, for what constitutes inadequate or excessive rates. Ideally these standards may consider:
 - “ the relationship between a company’s average price and a state-wide average price for all insurers
 - “ The distribution of a company’s prices around it’s average
- “ Let’s talk about what statistical tests you might recommend to regulatory actuaries. Specifically how would you handle the case where a specific rate(s) differs greatly from the average?

Some topics for future research by regulatory actuaries (part two)

- “ Develop specific standards, especially statistical, for what constitutes unfair discrimination.
- “ Let’s talk about what statistical tests you might recommend to regulatory actuaries. Specifically how would you handle the differences in rates among adjoining geographic territories?
- “ Develop specific standards, especially statistical, regarding the possibility of –re-tiering an current policyholder (offering a renewal premium that is significantly higher or lower, than the current premium).

One definition of excess profits

- “ According to Williams*, an insurer has earned excess profits [on Florida private passenger auto] if actual underwriting gain over three years exceeds the expected profit provision by more than 5 percent [*Selected Recommended Readings]
- “ Note this is not a definition of an excessive rate

- “ Will “disparate impact” supercede unfair discrimination as a rating standard?
- “ Will “disparate impact” result in all actuaries involved in ratemaking to become experts in price optimization?

What is disparate impact?

“ Miller [Selected Recommended Readings, 2009] states “Disparate impact has been defined by various courts as an unintentional discrimination against the protected minority class and ...not necessarily illegal”

When does disparate impact occur?

- “ According to Miller [2009]:
- “there is a significantly higher adverse impact on a protected minority class, and
- “Either the practice cannot be shown to have a ...legitimate business [purpose], or an alternate practice [can] achieve the business purpose without the adverse impact on the ... minority class”

What is a protected minority class?

“ It’s a class defined by race, color, religion, sex, or national origin [Miller, 2009]

What would the results of “disparate impact” be on insurance rates?

- “ According to Miller [2009], “accurate risk assessment will be destroyed, adverse selection will be widespread.....and coverage availability will suffer”
- “ What is your opinion?

Some evidence that subsidies in rates lead to adverse selection and increased moral hazard

- “ Derrig and Tennyson [Selected Recommended Readings, 2008] found that loss costs for Massachusetts towns receiving price subsidies were higher and grew faster than for towns giving price subsidies over the 1999-2007 period for private passenger auto

Comments on Derrig and Tennyson's study

- “ The formula for how subsidies are calculated is not shown in their paper.
- “ The towns receiving subsidies have significantly greater traffic density, 210.10 versus 93.56 (exposures per road mile) which may contribute to the higher loss cost and higher growth in loss costs over time

Selected recommended readings (part 1)

- “ Miller, Michael J.; Disparate Impact and Unfairly Discriminatory Insurance Rates; CAS Forum; 2009: Winter; pages 276-288
- “ Cummins, Smith, Vance; Risk Classification in Life Insurance; Lexington Books; Huebner International Series; 1982; pages 27-98
- “ Williams, C. Arthur; Regulating Property and Liability Insurance Rates Through Excess Profits Statutes; pages 445-472; Journal of Risk and Insurance
- “ Walters, Michael; Risk Classification Standards; Proceedings of the Casualty Actuarial Society; 1981; pages 1-18

Selected recommended readings (part 2)

- “ Miller, Michael J.; Discussion of Risk Classification Standards; Proceedings of the Casualty Actuarial Society; 1981; pages 19-23
- “ Ferris, Shauna and de Jong, Piet; Adverse Selection Spirals; ASTIN Bulletin; 2006; pages 389-628
- “ Salam, Romel; Reinventing Risk Classification; CAS Forum; Winter 1982; 73-120
- “ Derrig, Richard and Tennyson, Sharon; The Impact of Rate Regulation on Claims (Evidence from Massachusetts Automobile Insurance); CAS 2008 Discussion Paper Program; pages 1-33
- “ Regan, Laureen and Kleffner, Anne; The Role of Contingent Commissions in Property Liability Insurer Underwriting Performance; ARIA conference, August 2007; pages 1-23