Connecticut Recommendations and feedback for the Casualty Actuarial and Statistical (C) Task Force_Price Optimization:

Recommend a white paper be developed generally following the outline provided below by CASTF. The white paper should address the following:

Define price optimization and briefly discuss how that is perceived to be different from what companies normally do. (Like not always taking price indication). What is different? What raises the concern?

What factors would be included in an indication and what comes into play in the PO selection? What characteristics go into determining whether PO is used? Is it used at the individual risk level or class level? Does it use census block data?

What is the difference between the indicated rate and the PO indication? Need to ensure that the PO does not ignore the indicated loss cost or unfairly weight the LC to disadvantaged classes.

Should clearly state what type of practices or outcomes trying to avoid or would not want to have occur in a rating plan.

Develop regulatory best practices and principles that a PO program would adhere to.

Potential Outline (Staff)

1. Definition(s) of price optimization
   a. Is there a better name for this? --does it immediately sound like price gouging or “charge as much as possible & not necessarily what is fair”?
   b. Can this be divided into subcategories for analysis and discussion?
2. Rate indication vs. Final Rate/Price
3. Differences in how changed from what used to do
   a. Used to adjust prices for competition
   b. Didn’t always use indication
   c. Capped rate changes
   d. Varied based on how territories are drawn; rating categories/discounts are selected
4. U.S. Rate Law – not unfairly discriminatory
   a. Is price optimization (or subsets of) unfairly discriminatory?
   b. Is there some range of reasonability around an “indication”? (CAS calls a “reasonable range of analytic uncertainty.”)
   c. Is it unfair to charge more when a discount is noted and the company does not choose to have the discount in its rating plan?
   d. Is it unfair to charge more where the demand is high and supply is low?
5. Potential for misuse – new methodologies introduced have potential (e.g. breaking rate plan down into millions of cells); difficulty in analyzing rates today; price optimization could hide undesirable rate impacts
6. What do regulators need to check or ask?
7. Filing form changes? [ask for the Greatest possible difference from indicated rate to charged rate; ask for explanation of any deviation from loss cost.]
Hi Kris,

I was forwarded your e-mail from Tuesday to CASTF. Would it be possible to be added to that distribution list as an interested regulator?

I do have some thoughts that could be pooled with others on how CASTF might respond to the Auto Insurance (C/D) Study Group regarding price optimization in a paper. I present them in “draft outline” form. Please use your discretion on sharing any of my comments that may be useful or on point. I speak to how PO models impact rates. I am assuming this is a regulator only paper under consideration to facilitate coordination and efficiency in regulation. These are my own thoughts and not anything official from the IDOI nor have they had any type of legal review. I think a technical paper is a great idea to learn from each other and make progress on this issue.

1. Definitions of PO “Models” - Present the different definitions of PO Modeling published by relevant sources and compare. Distinguish what causes the leap from the perhaps traditional practice of “price optimization” to the more formal “price optimization models.” The scope of this paper is perhaps PO Models.
   a. Earnix, Towers Watson, other vendors, Consumer Groups
   b. Draft for consideration a refined PO definition(s) to be a starting point for discussion of US Insurance Regulators to ensure we are all talking about the same thing. (eg):
      i. Price Optimization Modeling in US P&C Insurance Rate Regulatory Environment – A mathematical modeling process of selecting a price for insurance that deviates from cost-based indications in effort to better achieve business objectives.
   c. Conclusion: Regardless of precise definition, PO modeling is a process that needs to be regulated by states in order to ensure compliance with state laws and regulations. It may not be a realistic option in many jurisdictions to stop the practice. Because Private Passenger Auto Insurance is generally a state mandated coverage, regulators should continue to work on correspondence and building efficiencies on the issue of PO modeling within the ratemaking function. This includes identifying and reviewing PO models. State insurance regulator concerns may or may not be limited to the Private Passenger Auto Line.

2. Recommendations for identifying PO within Rate Filing submissions:
   a. Rate Filing submissions - Buzz words to look for in rate filings that may suggest PO modeling of a consumer’s sensitivity to price changes impacting final premiums (even one of these buzz words, may be suggestive): “Price Optimization,” “Profit Maximization,” “Demand Curve,” “Elasticity,” “Maximize Retention.” Any new “Modeling techniques” that are vaguely described, “Capping,” “Stabilization,” “Price Sensitivity,” “Consumer Satisfaction,” “Lifetime Value”
   b. Market Conduct Examinations – Is the company using PO modeling to identify and target new business?
c. When provided with current, indicated and selected factors: 1. Look for or ask company how the indicated factors are developed. 2. A red flag for potential statutory violation might be if selected class factors move in the opposite direction of risk based indicated class factors.

d. Ensure that all rating factors used to develop final price are disclosed and filed. If a company is not forthcoming, perhaps the regulator asks the question directly.

e. Identifying in a filing may require judgment and asking questions. Companies may be intentionally vague.

3. **Reviewing PO Models:** Once it is suspected/discovered that a company is using PO Modeling in some fashion to calculate final prices, then what?

   a. State and company specific process. Companies would likely each have unique approach and States may have unique laws and regulations. Therefore, there is no “one size fits all” approach to a review.

   b. Is the actual final price movement for individuals in the direction of a credible class plan cost based actuarial indication? If the answer is “yes” then is it otherwise acceptable? If the answer is “no” then is there a statutory basis to object? What is an approach to evaluating and answering the question of materiality when the answer leads to a gray area, for example if the company puts a confidence interval around their risk based actuarial indication?

   c. Review technical modeling process – can we compile ways to assess whether a model is “good” or “not good” (e.g. meeting the standards of ASOP on Modeling) If a larger company is using PO nationwide, is it possible for regulators to have subject matter experts conduct a technical review of the models and share technical findings and thoughts on best practices? This could be independent or supplementary to an individual state’s statutory Review and reliance on findings at each state’s discretion. Maybe this could help open the black box and add some regulatory efficiency. Review model output for goodness of fit, statistical summaries, stability over time, achieving objectives. How can regulators evaluate the reasonableness of confidence intervals?

   d. Regulators compile and Identify PO model output, disclosures and visuals presentations that are most meaningful in clearly demonstrating PO Modeling in consideration of state’s statutory obligations.

   e. Companies should be prepared to provide relevant and meaningful demonstrations and discussions on their models if they believe they are ultimately compliant with state laws and regulations.

4. **Consequences of PO Models:**

   a. Incremental Impact of PO Models on protected classes? Does the rollout of a PO Model increase or lessen existing affordability concerns?

   b. In the hypothetical world where Price Optimization Modeling, specifically in a US P&C Insurance Rate Regulatory Environment, may find a common ground, can common characteristics of policyholders be clearly identified who may move towards their cost based rate relatively more or less quickly than they otherwise would?

   c. Would require separate study. Perhaps could be a consideration in technical review of larger insurers using PO Models.

   d. What “evidence” could state regulators be working to compile to demonstrate rates are unfairly discriminatory as a result of a formal PO plan? Are there visual demonstrations
we can ask the company for or ways to reasonably pose questions to uncover whether incidences of unfair discrimination take place either rarely, occasionally or rampantly and to what degree?

I appreciate the opportunity to provide feedback.

Thank you,

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Dear Kris: attached is a presentation I made just a few weeks ago to the American Academy of actuaries.

They key issues as I see them:

1> Price optimization encompasses a variety of models for increasing profits; revenue; claim handling; and retention and new business conversion. Regulators should be concerned about only the first three types of models. The claim handling models are not widely used today but could become important in a few years so we should proactively discuss them.

2> The key issue for the task force is to identify areas where the model recommends a price significantly higher or lower than traditional actuarial methods or results in claim handling that treats certain groups of claimants differently. If you look at my very last slide, in my opinion price optimization is going to grow dramatically and regulators will adapt by defining safe harbors or best practices. We have to develop a clear policy for what’s OK and what is not OK.

Arthur
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Presentation:
Slide 1-3:
Price Optimization, Insurance Regulation, and Disparate Impact with Examples
Annual Meeting of the American Academy of Actuaries in Washington DC
November 2014
Arthur J. Schwartz, MAAA, FCAS, Associate P&C Actuary, North Carolina Department of Insurance, Raleigh, NC
Disclaimer: These are my personal opinions and do not express the opinion of my employer or the American Academy of Actuaries

Slides 4-7 Price Optimization: What is it? This is a new and evolving area of actuarial practice. There may be several distinct objectives, so there’s no single definition nor a single widely accepted actuarial method. Recognizes that a price charged to an insured is a point estimate of a distribution of possible prices. Some of these prices would be excessive or inadequate, yet there would be a range of prices which could be charged, that would be considered reasonable.

Definitions 1) Can we adjust our current prices within a range of reasonable prices, to increase our profits, revenue, or customer retention, while recognizing the price elasticity of demand and the prices charged by competitors? 2) Traditional actuarial pricing is cost driven: the price for a specific class of insured is related to the expected claim costs, increased by expenses, risk load, and profit. Price optimization starts from those prices but also considers demand elasticity or a customer’s willingness and ability to pay, along with competitor’s prices.

Slide 8 How do other industries use price optimization? Internet retailers tailor their product or services to the needs and tastes of customers, by showing customers similar items or items that other people looked at, and by making special offers based on their shopping history. Airlines may use price optimization to fill empty seats that would otherwise go unsold. Hotels offer rewards to returning and loyal guests.

Slide 9 Possible Benefits of Price Optimization:
--- increased customer loyalty (higher retention rates, plus word of mouth advertising)
---higher conversion ratios for desired classes (policy offer accepted/applicants)
--- increased profit margins
--- increased volume of business
Slide 10 Models using price optimization:
- Obtaining and retaining business (strategies to boost new and renewal policies)
- Charging business a fair price (analyzing competitors prices)
- Managing claims

Slide 11 Price Elasticity of Demand (PED):
- Economists define PED = Change in demand / change in price
- It is a downward sloping curve
- Example: if price increases 10%, will demand stay the same --- or drop by ten percent --- or twenty percent?
- These outcomes correspond to inelastic (consumers really need this and will pay more), elastic (consumers generally need this), or very elastic (consumers can do without this or can find substitutes)?

Slide 12-13 Hypothetical example of considering PED
- Classes: ages 25 or less; 26 to 64; 65 or over
- Suppose a traditional actuarial rate level change is +8.2% uniform over all classes.
- Now let’s consider PED.
- Elasticity of demand by class: 0.70; 1.00; .85
- Why? Base class is 26 to 64; 25 or less is very price sensitive; and 65 and over are price sensitive too, but less so
- Exposures by class: 346; 723; 129
- Average rate $826
- Rate level change considering PED: minus 2.9% (!!!)
- We can make this more sophisticated by considering a PED curve rather than a point estimate of PED
- And by considering the effect on new business versus renewal business
- And by considering competitor’s prices for these classes
- And by estimating a distribution around the rate for each class, rather than using a point estimate of that rate

Slide 14-15 What is the true rate level change considering PED?
- Traditional actuarial method: +8.2%
- Traditional actuarial method considering PED on current book of business: -2.9%
- Traditional actuarial change considering PED on current book of business plus the projected effect on new business: -3.6%
- How would your management feel about making this filing, if given all the information above?
- Traditional actuarial method: +8.2%
- Traditional actuarial method considering PED on current book of business: +12.6%
- Traditional actuarial change considering PED on current book of business plus the projected effect on new business: +14.7%
- How would the regulator feel about approving this filing, if given all the data above?

Slide 16: Professionalism issue for discussion
As an aside, if we have calculated the additional rate level changes considering PED, is it right to not present it to management or not to present it to the regulator?

Slide 17: Elasticity in Auto Insurance
- The product consists of liability (required in almost all states at minimum limits) and physical damage (required by lenders)
- Liability is more inelastic than physical damage
- Drivers using their car for business or commuting are more price inelastic than pleasure use
- We can craft a more sophisticated PED which considers liability changes separately from physical damage changes, and links both to use of car
Slide 18-20: Private Passenger Auto Optimization Example

- We have two classification variables; these could be age, territory, or use of car
- Our objective is to maximize profit, but only by considering the difference between our rates and a competitor’s rates
- First constraint: our PED is -.5 (number of exposures drops by 5% if there’s a 10% increase in rates)
- Second constraint: a policyholder with our competitor will switch only if our rate is 15% or more below their rate

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<th>Our current rates</th>
<th>Class 2, AA</th>
<th>Class 2, BB</th>
<th>Competitors current rates</th>
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<tr>
<td>Class 1, C</td>
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</table>

Slide 21-23 How do we solve this?

- Unlike the earlier example, in which PED was a single point estimate by class, in this example we need to consider the tradeoffs of increasing our price versus losing business, in certain cells, and decreasing our price but gaining business, in other cells
- This would be a problem to which we could apply the “simplex method”

Sources to Price Optimization: In Excel and other spreadsheets, Solver (created by Frontline Systems, which makes a more powerful version available on its website, www.solver.com); Open Solver (freeware, www.opensolver.com)

Monte Carlo Simulation:

- To make the optimization more realistic, we could replace each rate with a normal distribution, with mean equal to the current rate, and standard deviation determined based on judgment
- Then we could simulate a set of current rates and run the optimization
- We could propose a final set of rates to the regulator which moved our current rates in the direction of the optimal rates, and state the difference from actuarially determined rates was based on judgment and competitive considerations

Slide 24: Other than insurance, how many industries can you name which can legally charge different applicants: different prices, offer different terms, or completely refuse to do business with a consumer?

Slide 25: Protected Classes: Definitions vary by state or federal agency but can include: race, gender, religion, national origin, age, or disability, among others

Slide 26-28: Two theories of discrimination

- “Disparate treatment” a business treats a “protected class” differently
- “Disparate impact” a business’ policy, though seemingly neutral, adversely affects a “protected class”
Proving Disparate Impact: Plaintiff must identify the policy; show the disparate impact; and show causation. Defendant may show that the policy serves a “business necessity”. Plaintiff may show that there is an alternative which can meet the “business necessity” but which would have a less discriminatory effect. 

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?

Slide 29 DeHoyos Case: This case alleged that Allstate’s credit scoring model had a racially adverse affect. Allstate settled; refunded certain policyholders; and revised their credit scoring model.

Slide 30 Statistical issues considered by courts for Disparate Impact cases: Time frame of data sample; Geographical area of data sample; Size of the data sample

Slide 31-33: Tests of statistical significance which courts have considered:

- The “four fifths” rule is not used much today because it’s not grounded in statistics. The rule says there’s discrimination if the ratio of a protected class is less than 80% of the ratio for the non-protected class
- Courts look at more sophisticated statistical analysis and tests
- For a regression model, R squared and F values for the overall model, along with T tests and p values for individual variables. P values of less than 0.05 are common.

Example of the four fifths rule
Non-protected class:
- 82 apply, 31 selected
- Ratio 37.8%
Protected class:
- 68 apply, 16 selected
- Ratio 23.5%
The ratio of ratios: 0.235/0.378=62.2%; This is less than 80.0%, therefore the protected class appears to be discriminated against.

Slide 34: The “McDonnell Douglas” test: Requires the Plaintiff to have membership in a protected class; application for insurance rejected even though qualified; while the Defendant approved the application for other qualified applicants

Slide 35: The “Reverse redlining” test: Requires the Plaintiff to have membership in a protected class; application for insurance accepted but on grossly unfavorable terms compared to other similarly qualified applicants (example higher price or reduced coverage)

Slide 36: Results of Price Optimization: Insureds with similar risk exposure, pay differing prices, or are offered differing terms of coverage, when those differences are not based on the expected cost, but are based on differences in their willingness and ability to pay. Is this unfairly discriminatory?

Slide 37-38 Current regulatory action & legal cases:
- On October 31, 2014, the Maryland DOI banned the use of price optimization in all lines of P&C insurance, because it creates unfair discrimination among applicants with similar risk exposure. Insurers using price optimization must re-file by January 15, 2015
- There is a disparate impact case from Texas in front of the US Supreme Court
- According to Paul Hancock, a lawyer filing on behalf of Texas: “The threat of disparate-impact liability means lenders must pay close attention to racial outcomes of even nondiscriminatory policies….It really pushes more toward advancement of [use of] racial quotas as the only way to avoid legal claims”

Slide 39-40 Is Price Optimization Unfair?
Many regulators believe that price optimization is unfairly discriminatory.
It is also a professionalism issue. According to the Code of Professional Conduct, Precept 1, Professional Integrity, states in part: “An actuary shall act honestly...to fulfill the profession’s responsibility to the public and to uphold the reputation of the actuarial profession”

Price optimization can extend to handling claims where insured A and B, with comparable claims, receive distinctly different payouts or differing terms. The difference could be based on whether the insurer wants to retain A as an insured but not B. Is this ethical?

Slide 41 Conclusion ...In My Opinion
- Price optimization can lead to legal and ethical issues for the insurer
- Price optimization creates professionalism issues for the actuary
- But the customer driven nature of price optimization virtually guarantees that it’s popularity will grow dramatically
- Regulators will have to adapt, and will ultimately define “best practices” or “safe harbors”

Slide 42 Citations:
- DeHoyos v. Allstate Corp, 345 F.3d 290 (5th Cir.) 2003
- Texas Department of Housing and Community Affairs v. The Inclusive Communities Project, 13-1371

Slide 43-44 Recommended Readings:
- Credit Scoring and Insurance, National Consumer Law Center, June 2007 (“NCLC”)
- Beyond The Cost Model, Serhat Guven and Michael McPhail, (accepted for publication in an upcoming issue of the Casualty Actuarial Society’s journal, “Variance”) (“SGMM”)
- Miller, Michael J.; Disparate Impact and Unfairly Discriminatory Insurance Rates; CAS Forum; 2009: Winter; pages 276-288 (“Miller”)

Slide 45-46: Thank you!
- Please feel free to contact me if you would like additional data or information to support anything in this presentation.
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