Introduction to Price Optimization

- Meryl Golden, General Manager North America, Earnix Inc.
- Mike Miller, FCAS, EPIC Consulting, LLC
Agenda

- About Earnix
- Price Optimization
- PO in Regulated vs. Unregulated Markets
- How Does PO Fit Into the Rate Setting Process?
- Some Misconceptions About PO
- EPIC Consulting’s View on the Ratemaking Process and PO
- Key Takeaways
- Questions
About Earnix

- Earnix is a privately held software company based in Israel doing business in more than 20 countries with sales & support offices in Connecticut, London and Mumbai.

- Our software helps financial institutions better understand their pricing decisions through the application of advanced analytics.

- For insurance companies, we offer **loss costs modeling** as well as an **end-to-end pricing platform**, utilized by an insurer’s Actuarial, R&D and Product Management organizations.

- We are one of the global leaders in the field of Price Optimization (PO).
What is PO?

PO is a systematic and statistical technique to help an insurer determine a rate plan that better fits the competitive environment, within actuarial and regulatory standards.

What does PO do?

PO helps inform an insurer’s judgment when setting rates by producing suggested competitive adjustments (output) to the indicated costs (input).

How does PO work?

PO utilizes a variety of applied mathematics techniques, such as linear programming, nonlinear programming and integer programming to analyze an insurer’s data and other considerations.
Price Optimization

In Other Words...

PO helps solve for the question, “What are the best alternatives to achieve my business goals?”

Exhaustive Search

PO enables an exhaustive search across thousands of pricing alternatives in multiple scenarios that assists insurers in their comparative rate analysis.

Improved Efficiency

PO improves the efficiency of the rate setting process and enables companies to more accurately predict the outcome of their rate decisions.
PO in Regulated vs. Unregulated Markets

**United States**
- CAS Statement of Ratemaking Principles
- Rate regulation
- Prices may change once or twice per year

**Unregulated Markets**
- No Ratemaking principles
- Less regulation; no rate filing or approval
- Individual pricing
- Prices change daily or even more frequently

Different Earnix Products Apply
How Does PO Fit Into the Rate Setting Process?

The rate setting process does not change with the use of PO; instead analytics supplement judgment in determining competitive adjustments to indicated costs.

**Process Without PO**
- Indicated Costs
  - Judgment
    - Business Goals
    - Market Position
    - Competitor Analysis
    - Agent Input
    - Customer Response
- Final Rates (Filed)

**Process With PO**
- Indicated Costs
  - Competitive Adjustments
    - Judgment & Analytics
      - Simulations
      - Price Optimization
- Final Rates (Filed)
PO produces suggested competitive adjustments to the indicated cost based factors.

**Indicated cost based premium** = Base premium \( \times \) **Age**

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**Suggested premium** = Base premium \( \times \) **Age**

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## Some Misconceptions About PO

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<td>“PO is inconsistent with actuarial standards.”</td>
<td>The same actuarial and regulatory standards apply to filed rates whether a company uses PO or not.</td>
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<td>“PO is about profit maximization.”</td>
<td>In some countries this is sometimes the case.</td>
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<td>“Companies that use PO set premiums based on the maximum amount a consumer is willing to pay.”</td>
<td>All companies consider customer response in their pricing today. With PO, this is done in a more scientific way, with statistical models rather than just using judgment.</td>
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<td>“PO produces rates that are unfairly discriminatory.”</td>
<td>Loss costs are the foundation of rate setting. With PO, factors are typically constrained to stay within the confidence interval of cost estimates. All adjustments are to existing rating factors.</td>
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<td>“With PO, rates change at time of quote violating company filings.”</td>
<td>This might be true in some unregulated markets but is not how PO is applied in the US.</td>
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Role of actuaries in ratemaking is to determine the expected losses, expected expenses, and reasonable provisions for profit and for contingencies.

Management may make adjustments within the actuarially indicated rates to reflect a variety of business considerations, including marketing, underwriting, and competitive considerations.

Rate regulatory laws in the individual states generally permit the rate filer to consider management's business judgment and competition to be considered in the determination of the rates to be filed and charged to insureds.

It is the responsibility of the rate filer to ensure that filed rates meet the statutory rate standards of adequate, not excessive, and not unfairly discriminatory.

An actuary is able to opine that the filed rates meet the statutory rate standards if, and only if, the filed rates reflect projected costs which are reasonably close to the actuary's projected costs.

The utilization of PO in the determination of the rates to be filed is an exercise of management judgment reflecting a variety of business considerations.
PO Does Not Impact the Actuarially Indicated Rate

- Statistical models can be fundamentally different; Only those that produce a cost component to be included in the rate or a risk characteristic that impacts any rate class are critical for the actuary and/or regulator to review.

- Catastrophe Models are filed because the projected losses produced by the models make-up the catastrophe loss provision built into the actuarially indicated rate. In order for the actuary and/or the regulator to judge the reasonableness of the loss provision in the rate, they need to be familiar with how the model works and the input data.

- Insurance Score Models are filed because they create risk characteristics used to define a rate class. There are certain standards any rate class must meet, or the entire rate schedule may be unfairly discriminatory. The actuary and/or the regulator need to be familiar with how the insurance score model works and the input data in order to determine if the insurance score is properly defining a rate class.

- PO Models have no impact on the actuarially indicated rate; PO Models produce suggested competitive adjustments to the indicated rate.
PO helps inform an insurer’s judgment when setting rates by providing suggested competitive adjustments to the indicated costs using advanced technical analysis.

The same actuarial and regulatory standards apply to rate filings whether a company utilizes PO in their rate setting process or not.

The adoption of advanced analytical techniques can improve pricing sophistication which benefits insurers and consumers.
Questions?
March 21, 2014

To: Joseph Murphy, Chair
Auto Insurance (C/D) Study Group
c/o Aaron Brandenburg, NAIC
(Via email to: ABrandenburg@naic.org)

Re: Price Optimization and Earnix Presentation

Dear Commissioner Murphy and Members of the Study Group:

Thank you for allowing us to submit comments and ask questions related to the Earnix presentation of March 17, 2014 before the Study Group.

This letter first presents why we feel Earnix's presentation was misleading and offers a series of questions based on the presentation and earlier Earnix documents. I appreciate your willingness to ask Earnix to respond to these questions.

As you will see, CFA concludes that insurer use of Earnix's price optimization tool harms consumers, particularly the 40 percent of Americans in low- and moderate-income populations. CFA believes that there is sufficient knowledge about price optimization to call upon NAIC to ban its use, or, at the very least, the NAIC should call for a moratorium on the use of Earnix's and other vendors' price optimization software until regulators have had the opportunity to fully review the models and truly understand their full impact.

**How Earnix Tried To Mislead The Study Group**

The St. Patrick's Day presentation by Earnix's General Manager in North America Meryl Golden before the National Association of Insurance Commissioners (NAIC) Auto Insurance (C/D) Study Group was astonishing in its divergence from statements made in advertisements and documents produced by Earnix prior to March 17, 2014. Given the suddenness of this transformation, we believe their presentation represents political spin rather than an authentic change in what price optimization is designed to achieve.

Here are but three examples of the Earnix spin:

1. The company attempted to redefine “price optimization.”
Prior to St. Patrick’s Day: Earnix promised prospective American insurance company customers that price optimization was a profit-maximizing tool:

“Price optimization is defined as using mathematical algorithms to determine optimal values of rating factors to meet business goals and constraints (e.g., maximizing profitability while achieving X% of policy growth.)”

Source: 2013 North America Auto Insurance Pricing Benchmark Survey

St. Patrick’s Day: price optimization was described as a minor adjustment to rating factor selections:

“Price optimization helps inform an insurer’s judgment when setting rates by providing suggested competitive adjustments to indicated costs using advanced analytic techniques” and

“Price optimization is a systematic and statistical way to help an insurer determine a rate plan that better fits the competitive environment, within actuarial and regulatory standards.”

2. Previously presented as a money making tool, price optimization became a technical refinement to the ratemaking process for the purposes of the NAIC presentation.

Prior to St. Patrick’s Day: Besides the above-quoted use of price optimization to “maximize profits,” there are numerous other references to the financial benefits from price optimization in the Earnix literature.

In a Best’s Review 2012 advertisement featuring Ms. Golden, Earnix promises “Companies that adopt price optimization realize substantial financial benefits...Late adopters will be at a competitive disadvantage.”

Source: “Price Optimization at the Tipping Point,” Bests Review [See Appendix 2]

Another company document explained: “The financial benefits of price optimization can be significant. Companies that adopt optimization as a pricing strategy can realize improvement of 1-4 points in the combined ratio and/or as much as a 10-20% increase in new business conversion rates.” Source: “Price Optimization in North America: Myth vs. Reality,” September 2012

St. Patrick’s Day: Ms. Golden hardly makes mention of “profits” or the previously promised “financial benefits” of price optimization tools except to deny that price optimization is about profits in U.S. insurance markets. Unlike her company’s profit promises prior to this presentation, on St. Patrick’s Day Ms. Golden described the idea that profit-maximization was a purpose of price of price optimization as a “misconception,” claiming:

[The misconception] is that price optimization is all about profit maximization. While this might be the case in other industries or within our industry for other countries but it is not the case for the US insurance market.

This is quite a statement. Ms. Golden asks regulators to accept that while profit maximizing is the objective of price optimization in other industries and for the insurance industry outside of the U.S., the software her company itself has previously marketed to U.S. insurers as a tool for “maximizing profitability” is not, in fact, a tool for maximizing profit.
3. Consider the use of the word “elasticity,” wherein prices can be raised on those groups of people who do not shop as much as other groups might.

Prior to St. Patrick’s Day: Earnix has repeatedly touted its product as an advanced predictor of a customer’s likely reaction to price increases – what economists call “price elasticity of demand.” Earnix even referred to price optimization as an “elasticity model.”

Referring to its own report that nearly half of America’s largest insurers “currently optimize their prices,” Earnix claimed that “[t]he most common use of elasticity models is for factor selection, mentioned by 58% of the companies that use such models.” Earnix added that “[w]hen asked to rate the top challenges in their pricing processes, respondents pointed out the following challenges: (1) Effectively incorporating knowledge of consumer price elasticity...”


Earnix explained that price optimization allows insurers to “[a]nalyze the price elasticity of each customer profile and uncover the efficient pricing frontier for each product in your portfolio.”

Source: Earnix.com “Price Optimization: Insurance Price/Rate Optimization”

“Earnix best-in-class analytics and patent-awarded optimization technology empowers insurers to implement pricing strategies that go beyond traditional risk cost pricing, incorporating demand elasticity models to maximize profit and growth objectives.” (Emphasis added)

Source: Earnix.com “Insurance Pricing and Customer Value Optimization”
When the company presented its product to regulators, however, elasticity was never mentioned. In the presentation the word “elasticity” was replaced by the word “competitive,” as if raising the rate for some increases competition.

The move away from actuarially sound rates

Earnix has also changed its tone, though not its substance on the relationship between price optimization and cost-based ratemaking. Prior to the St. Patrick's Day presentation, Earnix marketed its software as an iconoclastic tool to get past the tradition of actuarially based rates.

Prior to the presentation, the company claimed: “Earnix best-in-class analytics and patent-awarded optimization technology empowers insurers to implement pricing strategies that go beyond traditional risk cost pricing, incorporating demand elasticity models to maximize profit and growth objectives...In today’s competitive insurance market, traditional ratemaking based on risk and cost alone is no longer sufficient. The answer to the needs of insurers in the customer-driven age is incorporating demand and risk cost considerations to optimize pricing and customer value.” (Emphasis added) Source: Earnix.com “Insurance Pricing and Customer Value Optimization”

The company’s attack on the ratemaking process was much less aggressive in the St. Patrick’s Day presentation, during which its product was described, less dramatically, as merely a tool for “suggesting” minor adjustments that “helps inform an insurer’s judgment.”

Notably, Earnix did acknowledge that price optimization is a tool to move rates and rating factors away from the actuarially determined cost-based price levels. As the company’s consulting actuary Mike Miller put it, price optimization “is not an actuarial tool at all...It provides no input regarding expected costs; it provides nothing actuarial in nature in terms of projected losses and expenses.”

Though without the buzzwords of its marketing material, Earnix’s actuary admitted that price optimization changes prices from those based on actuarial principles to prices that are less actuarially sound than before price optimization techniques are applied. This is a huge change in ratemaking, taking us systematically away from cost-based rates, and it raises many serious questions that must be addressed by regulation.

The magnitude of the changes from price optimization can be large

In Earnix’s price optimization example (Presentation, Slide 8) they show factors rising above and below the traditional rating factor for selected factors. Aside from the fact that this appears to be a fabricated example that leaves the false impression that upward adjustments to prices are rare, the method of presentation also attempts to obscure the overall impact of this non-actuarial technique.
Using the example on Slide 8, for an under 21 year old driver of a 5 year old Ford, the combined rating factor for this risk prior to price optimization was 2.0544 (2.40 * 1.07 * .80) while the factor after price optimization would be 2.1496 (2.45 * 1.07 * .82), an increase of 4.6%.

Using only these three factors, the premium for this driver – assuming a $500 base rate – increases by approximately fifty dollars based on Earnix’s price optimization example. There is no actuarial justification for this increase.

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But the example provided by Earnix only incorporates three of dozens, and often hundreds, of factors insurers use to price auto insurance today. Therefore, if other factors were also changed by price optimization for this driver, for instance miles driven from 1.00 to 1.025, occupation from .975 to 1.00, education from .95 to 1.01, credit score from 1.00 to 1.035 and territory from 1.25 to 1.29 just to list a few of many possible hypothetical factor changes, the overall factor for the driver would rise from the pre-price optimization level of 2.3786 (2.40 * 1.07 * .80 * 1.00 * .975 * .95 * 1.00 * 1.25) to 2.9712 (2.45 * 1.07 * .82 * 1.025 * 1.00 * 1.01 * 1.035 * 1.29) after price optimization, an increase due just to the use of price optimization of 24.9%. In this scenario, the driver would be quoted a premium approximately $300 higher than his or her cost-basis determined by actuarially sound methods.

Actuarial standards require that “A rate is an estimate of the expected value of future costs.” Earnix should explain how premiums adjusted by price optimization meets that standard given that price optimization alters the price away from the calculation of expected value of future costs?

The only explanation Earnix gave at the St. Patrick’s Day presentation seems to be that there is some unknown (and undisclosed) “confidence interval” around each factor and rate that allows rates to vary from the factor indicated by the cost-based calculation. Earnix put it like this: “Loss costs are the foundation of rate setting. With price optimization, factors are typically constrained to stay within the confidence interval of cost estimates.” (Page 9 of the PowerPoint) “Typically constrained” is not a very reassuring standard for regulators to accept, even if one were to accept the confidence interval argument.
There are myriad problems with the idea of a “confidence interval” where the filing company can do whatever it wants to in dozens or hundreds of intervals around rating factors. Here are just a few of the problems:

- Insurers do not file a “confidence interval” around a price or a rating factor; insurers file a single figure for a price or a factor. Since no range is given, where does the “confidence interval” start and end? Does the insurer have the option to pick any number it chooses without declaring the range of the confidence interval? How does a regulator regulate that?
- What might appear to be reasonable selections within a confidence interval around rating factors can produce grossly excessive and unfair rates if the insurer selects the high end of the confidence interval for most factors. As shown above, just small changes in a few factors can produce prices that are hundreds of dollars above the actuarial price.
- It is a nightmare for regulators to “regulate” prices when “confidence intervals” are used rather than point estimates. How does a regulator keep track of all the selections to make sure that the combinations of factor selections do not produce unfair or excessive prices for all potential customers of the filing insurer?
- If confidence intervals are used, consumers surely must be given the information of where the price the insurer has chosen is in the range of prices the insurer could have selected. Consumers need to be able to ask, “Why am I paying more than the low end of the interval?” or “Why am I priced at the high end of the interval”?

Who Will Get Hurt By Price Optimization?

Though Earnix refused to discuss its methodology during the call (and, similarly, said it would not file its “black box” with regulators), it has been very clear in its marketing material that price optimization is an elasticity model that predicts how much of an increase different consumer classes will tolerate before non-renewing or not purchasing a company’s policy. Groups who tend to have fewer marketplace options for reasons of geography, time available, financial literacy or, more generally, tend to shop less than average are vulnerable to having premiums raised unfairly by price optimization.

Research shows that low- and moderate-income auto owners are struggling with affordability of state-required auto insurance. CFA has issued a series of six reports showing this serious problem. For instance, families in the lowest quintile of income in America only have an average income of $10,000. Our research shows that these families, particularly in urban areas, have little opportunity to buy minimum state-required auto insurance for less than $500 and frequently can’t buy it for less than $1,000. Often, in places like Detroit and Baltimore, the price can be over $2,000. Most of the uninsured motorists in America are lower-income but good drivers who simply cannot afford the coverage. Since research also indicates that the poor do not, for various reasons, shop as much as other consumers, it is likely that price optimization will make state-required auto insurance even more unaffordable for the poor in America.¹ The fact that price

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¹ “In fact, nearly one in three low-income households reports that they do almost no shopping around; only about one in eight higher income households don’t. One might hear such figures and respond,”caveat emptor,”
optimization will severely impact lower-income people and increase the uninsured motorist populations around the country requires regulatory action.

Conclusion

CFA believes that insurer use of Earnix’s and other vendor’s price optimization tools harms consumers, particularly the 40 percent of Americans in low- and moderate-income populations. For the reasons outlined herein, CFA concludes that there is sufficient knowledge about price optimization to call upon NAIC to ban its use. We therefore do request that the NAIC adopt a resolution calling on states to ban the use of price optimization.

It is clear at this point in the development of price optimization in insurance in America that, based on my discussions with this Study Group and several individual regulators, most regulators had (until very recently) no idea that price optimization was in use in their states, how it works or which insurers are using it. The states and the NAIC are at the very beginning of a steep learning curve on this subject. Given the lack of information and Earnix’s unwillingness to disclose its models for public review, we encourage you to, at the very least, consider a moratorium on the use of price optimization until regulators can get up to speed. If the investigation regulators conduct (we propose several questions for Earnix in Appendix 1 as suggested paths of inquiry) comes out the way we at CFA anticipate, the moratorium will become a permanent ban on the use of price optimization products because of violation of actuarial standards and state laws against excessive and unfairly discriminatory prices.

We appreciate very much, Mr. Chairman, that you agreed to hold the record open to receive this statement and submit additional questions for Earnix to answer. We attach, as Appendix 1. A set of “Questions for Earnix.” We look forward to getting their responses. Additionally, I have enclosed, as Appendix 3 the original letter I sent to regulators that Earnix’s consulting actuary highlighted in his St. Patrick’s Day presentation by saying: “I agree with every one of [Bob Hunter’s] concerns and would have co-signed that letter if he had invited me to do so.”

Yours truly,

J. Robert Hunter
Director of Insurance

but the fact is that many of these consumers are new to many of these markets and may not fully understand their options. That problem has grown worse as many of these markets have become more complicated over the past decade: From insurance plans to mortgage policies, consumers are often beset with large numbers of choices, making it more difficult to make smart decisions.” Source: From Poverty, Opportunity: Putting the Market to Work for Lower Income Families. Washington, DC: The Brookings Institution, 2006, page 11.
QUESTIONS FOR EARNIX

These questions relate to the slide presentation provided by Earnix to the NAIC Auto Insurance (C/D) Study Group on March 17, 2014.

1. How is a commissioner going to assess the impact of price optimization unless he or she can review the models or, at least, a tabulation of the effect by rating factor and the aggregate effect for at least enough drivers to understand the overall impacts?

2. You say that price optimization analyzes “an insurer’s data and other considerations” [slide 4].
   - What insurance data do you analyze?
   - What are the “other considerations” you analyze?

3. You say that price optimization “improves the efficiency of the rate setting process.” Since you also say that it is not actuarial and only comes in after the cost-based ratemaking happens, how does that improve efficiency – it adds a layer of time and resources, right? Or do you suggest that it can trim down the amount of time and resources that go into the actuarial side of the process?

4. You claim to have different Earnix products in the USA and UK (slide 6). One of the differences is that the US has “Rate Regulation.” Explain exactly how the use of price optimization is described and detailed in a rate filing so that regulation can see what is happening. How does a commissioner find out exactly how price optimization impacted the traditional risk-based rate? Please provide examples of rate filings where price optimization is explained and the results disclosed to regulators.

5. You claim that "The same actuarial and regulatory standards apply to filed rates whether a company uses price optimization or not.” (Presentation Slide 9). That is true, but the question is whether price optimization allows rates to meet those standards. If the rate moves away from the traditional risk based rate, it can easily fail to meet either actuarial or regulatory standards. For example, two identically risky persons being charged different prices is the classic definition of unfair discrimination. How does a regulator know how much impact price optimization has on factor of a rate in the filing? How does Earnix make sure no two identically risky persons are not charged a different price? How does the Earnix price optimization product assure that there is no disparate impact on lower-income Americans by the use of the Product?

6. Slide 10 states: “Rate regulatory laws in the individual states generally permit the rate filer to consider management’s business judgment and competition to be considered in the determination of the rates to be filed and charged to insureds.” Judgment and competition are typically used to explain the selection of lower than indicated rates. Can you show examples of a filing where an insurer raised rates and the insurer
justified this by claiming the increase above the actuarially indicated price was because of competition? Is not the normal use of competition along this line: the indicated rate in a region is plus 10% but the insurer choses to only ask for 6% because of competition? Should regulators allow an insurer with an indication of 10% to take 15% for “competitive reasons”? Put differently, how is raising the price a customer has to pay above the actuarially indicated level a “competitive” response to the market?

7. Slide 10 states: “It is the responsibility of the rate filer to ensure that filed rates meet the statutory rate standards of adequate, not excessive, and not unfairly discriminatory.” This is, as we have seen with other modelers, the escape clause from responsibility. Doesn’t this basically say that if the rates do turn out to violate the law, it is not Earnix’s fault? Does not Earnix have responsibility for creating a systematic way to overprice consumers that exposes the firm to liability?

8. Slide 10 states: “An actuary is able to opine that the filed rates meet the statutory rate standards if, and only if, the filed rates reflect projected costs which are reasonably close to the actuary’s projected costs.” Is it your intent that the liability for an improper charge, which occurred from the use of the Earnix price optimization tool, is shifted to the insurer’s actuary who is the one charged to meet Casualty Actuarial Society’s Standards of Practice? Does the CAS literature provide a standard for “reasonably close?” Does Earnix have any actuaries on staff? Do you have consulting actuaries other than Mr. Miller? When was Mr. Miller hired? Does he have any role other than attending this hearing and presenting the price optimization product to regulators?

9. How does Earnix assure that rates are not raised on the basis of income either directly or through proxies for income. This is particularly important to know since lower-income Americans are having trouble affording state required auto insurance and regulators need to know if lower-income people will be adversely impacted even further by price optimization.

10. During your presentation, you did not discuss price elasticity of demand even though it is discussed extensively in other Earnix documents. Does your algorithm include evaluation of consumers’ responsiveness to price changes? If so, under your algorithm, would a consumer (or class of consumers) found to be less responsive to price changes be identified for upward adjustments in premiums? How do you determine consumer (or class of consumers) responsiveness to price?

11. Has Earnix ever tested price elasticity by race or ethnicity? Have you tested it by income? Would it be OK to use race or income as a basis for your rate segmentation? Would it be OK to use proxies for race or income as a basis for your rate segmentation?

12. Since price optimization is marketed as a technique to increase profits for the insurer, are higher prices produced by price optimization excessive since they derive from prices above the indicated cost-based price?
13. If, as you say, the filing process for price optimized rates and non-price optimized rates are “identical,” how does a regulator determine if rates being presented are optimized or not?

14. The presentation suggests that price optimization need not be disclosed to regulators and that disclosing it might actually be worse for consumers. How can disclosure of price optimization harm consumers? Do you advise your clients to be sure to disclose to the regulators that your products have been used to optimize the rates being filed or do you advise them not to disclose it? Please supply documentation of any advice you give clients regarding the disclosure of information to regulators related to insurers’ use of price optimization.

15. Do you advise your clients to be sure to disclose to their consumers that your products have been used to optimize the rates being filed or do you advise them not to disclose it? Please supply documentation of any advice you give clients regarding the disclosure of information to consumers related to insurers’ use of price optimization.

16. Please provide the manual or other information you supply to insurers when they decide to use your price optimization product. This should cover not only the advice you give insurers on how to run the software but any advice you give them relative to how to interact with regulators when asked questions about the product. Do you ask to be involved if a regulator asks one of your clients about your price optimization product? Also, do you in any way restrict the insurers ability to disclose if and how price optimization is used when a consumer asks if it is used? Please supply all documents relative to this as well.

17. Is the place where rates are optimized in America always in a rate filing or is it, in some cases, in underwriting standards or in alternative product selection or at the point of sale in an algorithm? Please identify with precision all of the ways price optimization can be used to alter a price from the risk-based level in the United States. In places with open competition laws, like Illinois, does Earnix use a different price optimization model than in a place with tighter regulation, such as California? Please explain for each regulatory regime (prior approval, file and use, use and file, flex and open rating) how the Earnix model changes if at all.

18. Do you believe that small overcharges to consumers (above risk-based levels) meets regulatory standards but large ones, using the same methods, would not? Where is the point at which the increase fails to meet the standards?

19. Please give us examples, based on your experience, of segments most likely to be optimized upward in price. Would, for example, a 30-35 year old married woman’s premiums be a likely candidate?

20. Explain in detail the process of reverse engineering the prices in a rate structure to change them from risk-based to optimized. Is this reverse engineering disclosed in a rate filing? Please give us examples of filings where it was disclosed.
21. Should vendors of price optimization products be regulated as advisory organizations since their tools directly alter prices consumers pay for state required auto insurance?

22. Is one of the factors that price optimization is applied to territory? How does the Earnix optimizer protect the public from the possibility that price optimization could be used to “redline” territories through high prices?

23. “Individual Price Optimization. Where allowed by regulation, Earnix enables insurers to customize rates down to a ‘segment of one,” offering each customer the best possible product and price combination...while optimizing company goals for retention and profitability. Individualized rate quotes can be provided in real-time over the web, the call center or delivered to an agent.” (Emphasis added) Is this done anywhere in the USA? If so, where? If used anywhere in the USA, how can rates that vary constantly based on changes in demand pass muster as not being unfairly discriminatory?

24. In your survey of who is using price optimization in America you state: “Of the companies with over $1B GWP, 45% currently optimize their prices and an additional 29% are planning to adopt optimization in the near future. Only 3% of the companies with over $1B have no plans for price optimization.” (Emphasis in the original) (Source: “2013 North America Auto Insurance Pricing Benchmark Survey” – A survey “collected online from 73 executives and pricing professionals representing insurance companies that sell auto coverage in Canada and the United States.”) Please supply the names of insurers that you know are using price optimization in America (by state, if possible).

25. Research suggests that low- and moderate-income auto owners might be struggling with affordability of state-required auto insurance. Since research also indicates that the poor do not shop as much as other consumers, isn’t it likely that price optimization will make state-required auto insurance even more unaffordable for the poor in America?

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Price Optimization at The Tipping Point

Meryl Golden said companies that adopt price optimization realize substantial financial benefits. “Although some insurers have misconceptions about price optimization, adoption in the United States and Canada is well underway. Late adopters will be at a competitive disadvantage.”

How do you define price optimization? Insurance price optimization combines the best of the three traditional pricing approaches (cost plus, value-based, and market-based). It incorporates variables related to direct operating costs, consumer behavior, and the competitive environment to determine the best pricing strategy in order to achieve specific business goals.

What are some of the misconceptions about price optimization? There are many myths about price optimization. A common misconception is that companies need a huge number of observations to build robust demand models. Our experience shows that in most cases as few as 50 to 100,000 observations are enough to construct robust models of consumer demand.

Which insurers are using price optimization in North America? A survey conducted by Earnix shows the adoption of price optimization by insurers in the United States and Canada is well underway. Among companies with over $1 billion in auto insurance premium, 26% of the survey respondents currently use price optimization, while an additional 33% are planning to use it in the near future. These numbers match up with what we are seeing first hand in the field.

What is driving the rapid adoption of price optimization? Companies that adopt price optimization realize substantial financial benefits. These companies can see improvement of 1-4 points in the combined ratio and/or as much as 10-20% of a lift in new business conversion rates.

What can we expect next? The adoption trends of price optimization are analogous in many ways to the introduction of credit scoring in auto pricing. At first, most companies were skeptical, but within a few years virtually every insurer was using credit information. We are seeing a similar trajectory in price optimization today. Given the significant benefits realized by those that already use price optimization, we can only expect the pace of adoption to accelerate. Insurers that are late to adopt pricing optimization will be at a competitive disadvantage just like those that were late to incorporate credit scoring.
August 29, 2013

RE: Many Auto Insurers Filing Unfairly Discriminatory Auto Insurance Rates

Price Optimization Used to Raise Rates Above the Cost-based Level

Dear Director or Commissioner:

I am writing on behalf of the Consumer Federation of America to express concern about the practice of Price Optimization (PO), a practice where premiums are set based on the maximum amount a consumer is willing to pay, rather than the traditionally accepted methods of calculating premiums based on projected costs, such as claims, overhead and profit. We are particularly concerned about the use of PO in determining premiums for auto insurance.

There is considerable evidence that the practice of Price Optimization is widespread, actuarially unsound and unfairly discriminatory. We request any information you are able to provide on the use of PO in your state. If PO is in use, please provide any information on the steps you are taking to end this practice, which produces unfairly discriminatory auto insurance premiums, illegal in every state.

Background

According to a recent survey of 78 major insurance companies, 45 percent of insurers with gross written premiums over $1 billion currently optimize their prices for auto insurance and an additional 29 percent are planning such action in the near future. Among smaller insurers, 12 percent are now using price optimization for auto insurance with 41 percent planning adoption of Price Optimization soon.\(^1\) The survey finds that 55 percent of insurers “consider price elasticity” in setting prices.\(^2\)

Another study found that pricing strategies like PO weaken the buyer’s position when shopping for cars, may make them more susceptible to overpaying for car insurance since many lower income consumers are less likely to compare prices before buying goods and services.\(^3\)

Towers Perrin defines Price Optimization as follows:

Traditionally, many industries, including the insurance industry, have priced their goods and services based on supply-side factors (cost to produce the product plus a margin for profit). However, this cost-plus-profit approach leaves a lot of money on the table in the form of lower margins from existing customers and lost revenue from prospective customers.

\(^2\) Ibid, Slide 14.
According to AMR Research, between 1% and 5% of value is lost across all industries because companies do not know enough about their customers’ willingness to pay or don’t have the ability to profit from this knowledge. Pricing can be the most potent weapon companies have. When a more sophisticated pricing approach is implemented, operating profit increases significantly, much more than when other factors such as variable cost, volumes or fixed costs are adjusted. Effective price optimization allows a property/casualty insurer to increase and decrease premium prices based on a combination of marketplace variables, including (but not limited to) product demand, certain customer characteristics and the competitive landscape. The final step and culmination of this work is to develop a new pricing structure that optimizes profit per customer — in other words, that maximizes profitability subject to a minimum volume of business. Having established the optimal load for base profit, the impact of varying profit loadings on certain segments of the portfolio can be tested in subsequent iterations. For example, the company may wish to target segments that show above-average conversion rates and/or lower-than-average competitiveness, which may benefit from increased profit loadings and vice versa.4

In other words, by using price elasticity models, an insurer can raise the price of auto insurance for some segments of the population who are unlikely to change insurers if the premium price goes up above the cost-based level through application of Price Optimization.

In a webinar “Insurance Price Optimization: Keys to Success,”5 a presenter states that “The traditional pricing methodology was cost-centric” and proceeded to explain how to change that. “Pricing optimization engines allow for daily pricing scheme changes…” One example of Price Optimization, using samples to test the price, suggested the insurer could take a 1% sample:

EXAMPLE: On 1% of customers apply the following test model:

- 1st 10% increase price 0.5%
- 2nd 10% increase price 1.0%
- 3rd 10% increase price 1.5%
- Etc.…

Price Optimization Produces Illegal, Unfairly Discriminatory Prices for Auto Insurance

Under Price Optimization, after prices are established using cost-based ratemaking methods, the prices are adjusted within rating segments based on such factors as the competitive situation for that segment. If a segment is unlikely to change insurers if prices go up more, the prices are raised to the “optimum” level. Thus, two policyholders with identical risks as determined by cost-based methods would pay different prices for the same policy. This is classic unfair discrimination. For instance, the NAIC Property and Casualty Model Rating Law states the following as the primary rating standard “Rates shall not be excessive, inadequate or unfairly discriminatory.” All states prohibit unfair discrimination in insurance pricing.

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5 Nicholas Michellod, Insurance Analyst, Celent, May, 2011. Webinar hosted by Earnix
**Price Optimization Clearly Violates Current Casualty Actuarial Society Ratemaking Principles**

It is clear that Price Optimization is not actuarially sound and is unfairly discriminatory in that it moves pricing away from its historic cost-based approach. This cost-based approach has been widely accepted as the basis of proper ratemaking. For example, in the Casualty Actuarial Society (CAS) Forum of winter 2009, Mike Miller, FCAS, wrote an article, “Disparate Impact and Unfairly Discriminatory Insurance Rates” Finding that:

Historic actuarial literature, general insurance literature, and legislative histories reveal ‘unfairly discriminatory rates’ to be a cost-based concept. A rate structure is unfairly discriminatory if the insurance premium differences between insureds do not reasonably correspond to differences in expected insurance costs.

But this historic requirement is under attack by those seeking to set rates using PO, rather than cost-based considerations.

**Attempts by Insurers to Surreptitiously Change CAS Principles Have Failed**

Using Price Optimization, rather than the cost-based approach fails to meet actuarial standards. On October 18, 2012, the CAS presented an aptly named webinar, “Price Optimization vs. Actuarial Standards” where questions were raised on the practice of adding things to “cost-based analytics,” things such as demand considerations (how much can rates be raised above cost-based price to reflect inertia in certain market segments) and competition.

The panel addressed the following questions:

- “Price Optimization – How does it fit with the actuarial profession?” (Noting that “cost-based analyses are clearly actuarial,” but not saying the same about demand and competitive considerations.)
- “Is putting the three considerations together an actuarial exercise?”
- “Is it ratemaking?”
- “Is it in compliance with the Statements of Principles and Actuarial Standards of Practice?”
- Do the ratemaking standards cited above “mean that Price Optimization is NOT ratemaking” (Emphasis in original)
- “Should (or may) an actuary consider outcomes other than cost when making rates?

One panelist said that insurance regulators have a duty to control the use of Price Optimization but that the CAS and the industry do not have a duty to warn them that it is developing PO or that PO is currently in use. One panelist noted that state insurance regulators are “at an incredible disadvantage” when they attempt to analyze things like Price Optimization.

Another panelist said (twice) that the use of Price Optimization “could be unethical.” Another said state laws requiring that rates not be unfairly discriminatory leads to tension since “Price Optimization does advantage one segment over another...”

Some of the panelists admitted that there is a tension between the CAS Standards and the use of Price Optimization. One said that the CAS must revisit the Standards to “get up to date.” When
asked if the actuarial Standards had to be changed so Price Optimization could comply, one panelist answered, “Yes. The tension is there and must be relieved. We need a safe harbor.”

So, without explaining that PO was involved, The CAS proposed changes to the Statement of Principles Regarding Property and Casualty Ratemaking, with comments due from members of the CAS by June 10, 2013.

**CFA filed a statement in Opposition to the CAS Move to Alter the Actuarial Principles**

I filed the attached comments with the CAS President on May 17, 2013, copies to the NAIC President and CEO and some leaders of the C and D Committees. In it, I explain in detail why the proposed changes to the Principles open the door to making PO meet actuarial Standards’ muster, though this goal is not stated in the draft or other materials I have read pertaining to the release of the draft.

**California Commissioner Jones Has Term PO to Be Unfairly Discriminatory and the CAS Actuarial and Statistical Task Force Has Expressed Concern That PO Could Conflict with State Laws**

On May 21, 2013, Commissioner Jones of California sent the attached letter to the CAS in which he highlighted that the proposed language “appears to open the door to allow new pricing schemes such as ‘price optimization’ to enter the discussion of actuarially sound ratemaking.” Commissioner Jones went on to say that “There are no differentials allowed (in California) based on whether the applicant or insured is more or less likely to look elsewhere for a lower price; we would consider such distinctions to be unfairly discriminatory” (Emphasis added).

On May 22, 2013, the Chair of NAIC’s Casualty Actuarial and Statistical (C) Task Force, Richard Piazza (LA), wrote to the CAS President regarding the proposed Principles as follows: “Many on the Task Force are concerned with the shift of emphasis from loss based ratemaking principles to principles that encompass subjective market driven ratemaking.” He also questioned, “how this concept would not conflict with state rating laws that require rates not to be excessive, inadequate and unfairly discriminatory.”

The CAS has indicated to me that it is reconsidering the changes in Principles and will reissue any changes for further comment.

**Half of Large Insurers Are Already Using PO, Requiring Immediate, Strong State Action**

The survey quoted above tells us that almost half of large insurers are already using PO in this country. So we ask you:

- Is PO in use in your state?
- Have you approved any such use of PO?
- Have you researched any behind-the-scenes, unapproved use of PO in your state?

In addition, please send us copies of any filings you have received where PO is proposed for use, including any action you have taken on such filings.
In the insurer survey, insurers listed the seven “top challenges in their pricing process.” The first (most important) challenge is “Effectively Incorporating Knowledge of Consumer Price Elasticity.” The sixth challenge is “Ensuring Regulatory Compliance.” It is time to make "ensuring regulatory compliance" number one. You must act to stop the use of PO in your state since it is both actuarially unsound under current CAS Principles and produces rates that clearly are unfairly discriminatory.

Sincerely:

J. Robert Hunter
Director of Insurance

attachments

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May 17, 2013

Gary R. Josephson, President
Casualty Actuarial Society
4350 North Fairfax Drive (Suite 250)
Arlington, VA 22207
(By Email to Diane Tremblay at CAS)

Comments of J. Robert Hunter, FCAS
on the Discussion Draft of Statement of Principles
Regarding Property and Casualty Insurance Ratemaking

This is in response to the captioned Discussion Draft for which comments are due on June 10, 2013.

The draft does not impact Principle 1, which says “a rate is an estimate of the expected value of future costs.” Principle 2 is similar and also unchanged, “a rate provides for all costs associated with the transfer of risk.” These are the traditional requirements that an actuarially sound rate be “cost-based.”

This cost-based approach has been widely accepted as the basis of proper ratemaking. For example, in the CAS W-Forum of Winter 2009, Mike Miller, FCAS, wrote an article, “Disparate Impact and Unfairly Discriminatory Insurance Rates.” Here is a portion of the first part of the Abstract: “Historic actuarial literature, general insurance literature, and legislative histories reveal ‘unfairly discriminatory rates’ to be a cost-based concept. A rate structure is unfairly discriminatory if the insurance premium differences between insureds do not reasonably correspond to differences in expected insurance costs.”

But this historic requirement is under attack by those seeking to make rates in a new way, a way in which rates are not cost-based but based on other than cost-based considerations and, indeed, move the rate away from being cost-based. The prime example of such a trend is in the growing use of “Price Optimization.” Towers Perrin explains this new idea: “Traditionally, many industries, including the insurance industry, have priced their goods and services based on supply-side factors (cost to produce the product plus a margin for profit). However, this cost-plus-profit approach leaves a lot of money on the table in the form of lower margins from existing customers and lost revenue from prospective customers. According to AMR Research, between 1% and 5% of value is lost across all industries because companies do not know enough about their customers’ willingness to pay or don’t have the ability to profit from this knowledge. Pricing can be the most potent weapon companies have. When a more sophisticated pricing approach is implemented, operating profit increases significantly, much more than when other factors such as variable cost, volumes or fixed costs are adjusted...”¹ In other words, you can gouge some segments if you use Price Optimization.

One insurer in Europe (where Price Optimization is more developed) used a sample of one percent of a particular market segment within a line of insurance to test Price Optimization. It used a test like this:

“EXAMPLE: On 1% of customers apply the following test model:

- 1st 10% increase price 0.5%
- 2nd 10% increase price 1.0%
- 3rd 10% increase price 1.5%
- Etc....

This was used to see how much rates could go up over the cost-based level to find the maximum profit level from the mix of higher than cost-based prices and the level of consumers opting to leave as the price rises. This is obviously a long way from traditional pricing approaches.

There is great inertia in the personal lines insurance market. People tend to not shop much. A recent survey of American personal lines policyholders showed that 24 percent of auto insureds had never shopped for auto insurance (27 percent never did for home insurance), 34 percent had rarely shopped for auto insurance (33 percent for home insurance) and only 27 percent shopped within every other year for auto insurance (20 percent for home insurance). Price Optimization tries to find these inert policyholders and jack up their prices.

On October 18, 2012, the CAS presented an aptly named webinar, “Price Optimization vs. Actuarial Standards” where questions were raised on the practice of adding things to “cost-based analytics,” things such as demand considerations (how much can rates be raised above cost-based to reflect inertia in certain market segments) and competition. The panel wrestled with questions like:

- “Price Optimization – How does it fit with the actuarial profession?” (Noting that “cost-based analyses are clearly actuarial,” but not saying the same about demand and competitive considerations.)
- “Is putting the three considerations together an actuarial exercise?”
- “Is it ratemaking?”
- “Is it in compliance with the Statements of Principles and Actuarial Standards of Practice?”
- Do the ratemaking standards cited above “mean that Price Optimization is NOT ratemaking” (Emphasis in original)
- “Should (or may) an actuary consider outcomes other than cost when making rates?”

The participants in the webinar were:

2 The Voice of the Personal Lines Consumer, Deloitte, 2012
• Jeff Kucera, moderator. He was with Allstate and Tower-Watson before retiring.
• Mike McPhail, USAA
• Chet Szczepanski, with Donegal Insurance.

They did a good job and the discussion was lively and interesting.

One panelist said the regulators have a duty to control the use of Price Optimization but that the CAS and the industry has no duty to warn them that it is developing or in use. (Even though one of the panelists said that regulators are “at an incredible disadvantage” when they attempt to analyze things like Price Optimization.)

One panelist said (twice) that the use of Price Optimization “could be unethical.” Another said that the laws in the states requiring that rates be fair leads to tension since “Price Optimization does advantage one segment over another…”

Some of the panelists admitted that there is a tension between the CAS Standards and the use of Price Optimization. One said that the CAS must revisit the Standards to “get up to date.” When asked if the actuarial Standards had to be changed so Price Optimization could comply, one panelist answered, “Yes. The tension is there and must be relieved. We need a safe harbor.”

And that is what this draft change to the Statement of Principles Regarding Property and Casualty Ratemaking seems to me to be all about, although this goal is not stated in the draft or other materials I have read pertaining to the release of the draft. It would be really inappropriate if the CAS put out a draft without stating the real intent of the changes if the intent is to allow Price Optimization to pass muster under the SOP.

Here is the language, part of the “Conclusion” section, which I think explodes the historic principles of cost-based ratemaking (underlined language new, struck through language deleted):

The actuary, by applying the ratemaking Principles in this Statement, will derive an estimation of the future costs associated with the transfer of risk. Other business considerations including marketing goals, competition and legal restrictions are also a part of ratemaking determining the final price. By interacting with professionals from various fields including underwriting, marketing, law, claims, and finance, the actuary has a key role in the ratemaking process and determining the final price.

Note that the draft subtly introduces “determining the final price” as distinct from “ratemaking.” This change by itself is shocking since the actuaries apparently thereby relinquish the role of determining insurance prices. Worse, this language, combined with the addition of using unlimited “marketing goals and competition” in
“determining the final price,” opens the door to full-fledged Price Optimization. Marketing goals and competition are mentioned in the current Statement of Principles as follows: “This process involves a number of considerations including marketing goals, competition and legal restrictions to the extent they affect the estimation of future costs associated with the transfer of risk.” Note that marketing goals and competition can, under the current SOP, be used only “to the extent they affect the estimation of future costs associated with the transfer of risk,” thereby not allowing the things that Price Optimization does like raising prices above costs to maximize profit of insurance companies.

I oppose this change. If CAS does not intend to open the door for Price Optimization, it should immediately say so, withdraw the draft and fix the language.

However, if a change of this magnitude is intended, (i.e. a change in the fundamental cost-based nature of insurance pricing) the CAS should withdraw the draft and reissue the document with a clear explanation of the rationale and the anticipated impacts on policyholders, particularly on the poor who shop very rarely. Further, prior to any decision on a change of this magnitude, CAS should open the door widely for input to the NAIC, individual state commissioners, the FIO, consumer groups, insurers and other interested parties to aid in this historically important decision-making process. What CAS may be proposing ends the era of risk-based pricing forever in favor of a system that lets insurers charge what the market will bear. It should not be done stealthily in the dark recesses of the actuarial society alone.

I also have to ask one final, very basic question: What is the purpose of having principles at all if cost-based indications can be ignored by insurers by adding non-cost-based considerations to alter the actuarially-indicated rate?

Sincerely,

J. Robert Hunter, FCAS. MAAA

(Note: For identification, the writer is Director of Insurance at Consumer Federation of America and formerly served as Texas Insurance Commissioner)

cc: James J. Donelon, NAIC President and Chair of the Casualty Actuarial and Statistical Task Force; Ben Nelson, NAIC CEO; Kevin McCarty, Florida Insurance Commissioner, Immediate NAIC Past President; Mike Chaney, Mississippi Insurance Commissioner and Chair of the Property and Casualty Insurance (C) Committee; Sharon Clark, Kentucky Insurance Commissioner and Chair of the Market Regulation and Consumer Affairs (D) Committee; Dave Jones, California Insurance Commissioner; Benjamin Lawsky, Superintendent, New York Department of
Financial Services; Eric Nordman, Director of Regulatory Services, NAIC Staff; Aaron Brandenburg, Manager I, NAIC Staff; Mike McRaith, Director, Federal Insurance Office.
Mr. Richard N. Piazza, ACAS  
Chief Actuary  
Louisiana Department of Insurance  
Post Office Box 94214  
Baton Rouge, LA 70804

May 21, 2013

Re: Statement of Principles Regarding Property and Casualty Insurance Ratemaking

Dear Mr. Piazza,

I am sending this to you in your capacity representing Commissioner Donelon as the Chair of the Casualty Actuarial and Statistical (C) Task Force. I am very concerned about the recent proposal for changes to the conclusion of the "Statement of Principles Regarding Property and Casualty Insurance Ratemaking" under consideration by the Casualty Actuarial Society (CAS). Certain of these changes were brought to my attention by Robert Hunter, Insurance Director for the Consumer Federation of America.

These are the proposed edits to the conclusion of that document that are of my concern:

The actuary, by applying the ratemaking Principles in this Statement, will derive an estimation of the future costs associated with the transfer of risk. Other business considerations including marketing goals, competition and legal restrictions are also a part of ratemaking determining the final price. By interacting with professionals from various fields including underwriting, marketing, law, claims, and finance, the actuary has a key role in the ratemaking process and determining the final price.

Mr. Hunter, who is a Fellow in the CAS, pointed out in his May 17 letter to the Society that these proposed changes to the conclusion of the Statement of Principles do not harmonize with a fundamental tenet of actuarial standards, that rates be based on the expected value of all future costs (as is stated in the four Principles listed earlier in the same Statement). I agree with Mr. Hunter that the
new language appears to open the door to allow new pricing schemes such as
"price optimization" to enter into the discussion of actuarially sound ratemaking.
In price optimization, price differentials are imposed into the determination of
premium with the purpose of charging each insured the highest price expected to
receive that consumer's acceptance.

In California, property-casualty insurance rates are set without regard to
competition. There are no differentials allowed based on whether the applicant
or insured is more or less likely to look elsewhere for a lower price; we would
consider such distinctions to be unfairly discriminatory. It is our position that any
such adjustments to the rates would be inconsistent with the actuarial principles.
While the proposed edits to the Principles do not explicitly indicate that such
pricing activities will reside within the actuarial realm, the language is sufficiently
vague as to allow this interpretation. I am hopeful that the Casualty Actuarial
and Statistical Task Force shares my position and that the Task Force will
communicate this objection to the Casualty Actuarial Society regarding the
proposed edits to the conclusion of the Statement of Principles.

Sincerely,

[Signature]

DAVE JONES
Insurance Commissioner
To: Gary R. Josephson, CAS President  
From: Richard Piazza (LA), Chair, Casualty Actuarial and Statistical (C) Task Force  
Date: May 22, 2013  
Re: Discussion Draft of Statement of Principles Regarding Property and Casualty Insurance Ratemaking  

Thank you for the opportunity to provide comment on the Casualty Actuarial Society’s draft of the Statement of Principles Regarding Property and Casualty Insurance Ratemaking.

The Casualty Actuarial and Statistical (C) Task Force (“Task Force”) discussed the proposed revisions (“Draft”) to the existing Statement of Principles Regarding Property and Casualty Insurance Ratemaking (“Existing Principles”) during a conference call on May 21, 2013. The Task Force, at a minimum, is concerned with the elimination of standards language from the Existing Principles prior to the release of proposed revisions to the Actuarial Standards of Practice for ratemaking. Also, many on the Task Force are concerned with the shift in emphasis from loss based ratemaking principles to principles that encompass subjective market driven ratemaking.

The Task Force is in support of retaining use of the Existing Principles, published in May 1988, until proposed revisions are exposed for the Actuarial Standards of Practice for ratemaking. The Task Force believes it appropriate to publish revised principles and revised standards for ratemaking simultaneously so they can be reviewed conjunctively. The Task Force requests that the Draft remain open for review to overlap the exposure period of a revised Actuarial Standards of Practice for ratemaking.

For transparency, the Task Force also requests that further explanation be provided of the proposed revisions including but not limited to elimination of the considerations section. And lastly, explain why the CAS finds it necessary to introduce the concept of the actuary’s contribution to a “final rate” in the ratemaking principles and how this concept would not conflict with state rating laws that require rates not to be excessive, inadequate, and unfairly discriminatory.

If you have questions, please contact me at 225-342-4689 or RPiazza@ldi.la.gov or Jennifer Gardner at 816-783-8758 or jgardner@naic.org.

cc: Jennifer Gardner, Kris DeFrain (NAIC)
March 28, 2014

Commissioner Adam Hamm
President, National Association of Insurance Commissioners

By Electronic Mail

Re: Prohibiting the Use of “Price Optimization” in Insurance Pricing as Clear Violation of Unfair Discrimination Provisions in State Rating Laws

Dear Commissioner Hamm and Members of the NAIC:

The Consumer Federation of America (CFA) and the Center for Economic Justice (CEJ) write to urge state insurance regulators, individually and as members of the NAIC, to stop the use of “price optimization” by insurers to set premium charges for consumers. In this letter, we explain what “price optimization” is, why it clearly violates statutory and actuarial standards barring unfairly discriminatory rates, and why it will lead to higher rates for the most vulnerable consumers for reasons completely unrelated to risk of loss.

Price optimization is a software / data mining / predictive analytics tool marketed by Earnix. It promises to help insurers maximize revenue and profitability by adjusting rates based upon consumer price elasticity of demand (i.e., responsiveness to price changes). Stated differently, with price optimization models, insurers charge higher prices to those consumers deemed least likely to shop around in the face of a rate increase. Since price optimization is a rating factor – based on Earnix’s evaluation of a consumer’s responsiveness to price changes – and since such a rating factor is unrelated to risk of loss or expenses associated with the transfer of risk, insurers’ use of price optimization leads to consumers of similar risk and expense being treated differently.

We believe most regulators are not aware of insurers’ use of price optimization because insurers do not file price optimization factors or models with regulators and do not include price optimization in filed rates or underwriting guidelines. Rather, based on guidance by Earnix, insurers treat price optimization as “management discretion” to deviate from cost-based rates for “competitive purposes.”

CFA and CEJ call on state insurance commissioners to immediately stop insurer use of price optimization software based on price elasticity of demand. Such price optimization is an unfair rating factor that clearly violates statutory and actuarial standards for rates. Moreover, since research shows that low- and moderate-income consumers shop less than wealthier Americans for a variety of reasons including fewer points of access to the market, time constraints and lack of financial experience, price optimization has a disproportionate impact on these consumers – compounding the difficulty they already have affording state-required auto and lender-required homeowners insurance. We respectfully request and urge the NAIC to adopt a resolution calling on states to ban the use of price optimization.
1. What Earnix Tells Regulators versus What Earnix Tells Insurers

In a March 17, 2014 presentation to the National Association of Insurance Commissioners (NAIC) Auto Insurance (C/D) Study Group, Earnix representatives presented its product in a substantially different manner than it had in prior communications, marketing materials and public statements. At its essence, Earnix hopes that by calling a risk classification something else – “management discretion” – that a risk classification will somehow be transformed to something else in the eyes of regulators. We have seen this scenario in the past when insurers decided to call rating factors something else – tier placement factors – and then treat the rating factors as underwriting guidelines which then were not filed with regulators. Advising insurer actuaries how to use of “tier placement factors” to avoid filing rating factors with state insurance departments has been a staple of the Casualty Actuarial Society annual Ratemaking and Product Management meeting for many years.

In an appendix to this letter, we detail several misrepresentations made by Earnix to regulators, including:

- hiding the purpose of price optimization as something other maximizing insurer profitability;
- hiding the foundational factor of price optimization – price elasticity of demand or, stated more simply, raising prices for those consumers less likely to shop around in the face of a premium increase; and
- representing price optimization as something other than a risk classification based on a factor – price elasticity of demand – unrelated to loss costs or other costs associated with the transfer of risk

2. Price Optimization is a Prohibited Risk Classification

It is clear why Earnix has changed its presentation of price optimization to be something outside of the ratemaking process – using price elasticity of demand clearly violates statutory rate standards for unfair discrimination and actuarial standard for cost-based pricing. Now, Earnix argues that price optimization is a tool to systematically move rates and rating factors away from the actuarially determined cost-based price levels but claim this violates neither the rating laws’ requirements that rates not be excessive, inadequate or unfairly discriminatory nor the actuarial standard that rates be cost-based.

Knowing that price elasticity of demand is a prohibited risk classification, Earnix attempts to rebrand it as something other than a risk classification. But, price elasticity of demand through a price optimization model is a risk classification subject to statutory limitations on unfair discrimination. It is a characteristic of the consumer used to determine the premium charge for that consumer – like any other rating factor or tier placement factor.
State insurance regulators have not kept up with insurer developments in data mining and advanced modeling of rates. Insurers are combing all available databases to mine data for maximizing profit and the Earnix price optimization is the latest example. **But price optimization represents a watershed event, the use of factors unrelated to insurer costs for the setting of rates for individual consumers. It is a textbook example of unfair discrimination in which two consumer posing the same risk of loss will be charged different premiums because one of the consumers is less likely to shop around in the face of, say, an 8% premium increase than the other.**

3. **Price Optimization Will Disproportionately Hurt the Most Vulnerable Consumers.**

During the March 17, 2014 call, Earnix made the incredible claim that price optimization would promote greater competition among insurers and that consumers would benefit from such competition. The claim is preposterous because the entire premise of price optimization is that insurance markets are not competitive – that some consumers will pay more than a cost-based premium because they are not expected to shop for a lower price. Rather than promoting competition, price optimization raises insurer revenues due to the absence of consumers exerting market pressure to discipline insurers.

The clear losers from price optimization are vulnerable populations – low- and moderate-income consumers and minority consumers. Groups who tend to have fewer marketplace options for reasons of geography, time available, financial literacy or, more generally, tend to shop less than average are vulnerable to having premiums raised unfairly by price optimization.

Research shows that low- and moderate-income auto owners are struggling with affordability of state-required auto insurance. CFA has issued a series of six reports showing this serious problem. For instance, families in the lowest quintile of income in America only have an average income of $10,000. This research shows that these families, particularly in urban areas, have little opportunity to buy minimum state-required auto insurance for less than $500 and frequently can’t buy it for less than $1,000. Often, in places like Detroit and Baltimore, the price can be over $2,000. Most of the uninsured motorists in America are lower-income but good drivers who simply cannot afford the coverage. Since research also indicates that the poor do not, for various
reasons, shop as much as other consumers, it is likely that price optimization will make state-required auto insurance even more unaffordable for the poor in America. The fact that price optimization will severely impact lower-income people and increase the uninsured motorist populations around the country requires regulatory action.

4. CFA and CEJ Call on State Insurance Commissioners to Stop the Use of Price Optimization Now.

It is clear at this point in the development of price optimization in insurance in America that, based on our discussions with this Study Group and several individual regulators, most regulators had (until very recently) no idea that price optimization was in use in their states, how it works or which insurers are using it. In a survey of insurers’ use of predictive analytics and price optimization, Towers Watson found:

While many carriers are not currently using either price integration (i.e., bringing together customer behavior, competitor and loss cost models to derive key business metrics, such as profit and volume, to test the impact of different rate scenarios) or price optimization (i.e., the application of a mathematical search algorithm to a price integration framework, aiming to identify the rates that maximize business metrics), they increasingly plan to do so.

54% of personal lines respondents are using price integration, including 12% that have moved to price optimization.

Earnix itself states that: “Of the companies with over $1B GWP, 45% currently optimize their prices and an additional 29% are planning to adopt optimization in the near future. Only 3% of the companies with over $1B have no plans for price optimization.” (Emphasis in the original) (Source: “2013 North America Auto Insurance Pricing Benchmark Survey,” Earnix)

The 2013 regulatory modernization report by the Federal Insurance Office identified the problem posed by insurance data mining activities as exemplified by price optimization. The report recommended:

1 “In fact, nearly one in three low-income households reports that they do almost no shopping around; only about one in eight higher income households don’t. One might hear such figures and respond, ‘caveat emptor,’ but the fact is that many of these consumers are new to many of these markets and may not fully understand their options. That problem has grown worse as many of these markets have become more complicated over the past decade: From insurance plans to mortgage policies, consumers are often beset with large numbers of choices, making it more difficult to make smart decisions.” From Poverty, Opportunity: Putting the Market to Work for Lower Income Families. Washington, DC: The Brookings Institution, 2006, page 11.

(1) States should develop standards for the appropriate use of data for the pricing of personal lines insurance;
(2) states should extend regulatory oversight to vendors that provide insurance score products to insurers;
(3) FIO will study and report on the manner in which personal information is used for insurance pricing and coverage purposes.

With an ever-expanding universe of personal information available, important questions regarding boundaries or limitations on the use of that personal information should be answered in the context of insurance. Therefore, regulatory policy and practice must clarify that the criteria and methodologies actually used by insurers not rely on impermissible or discriminatory factors. Risk classification factors may be an appropriate subject for binding, uniform federal standards, particularly to the extent that insurance scoring methodologies involve factors that implicate rights secured under federal law.

We urge state insurance regulators to not only stop the use of price optimization, but to develop a modern regulatory framework for insurance risk classifications that recognizes insurers’ access to and increasing use of mountains of personal consumer information and protect consumers against unfair discrimination.

Thank you for your consideration.

Yours truly:

J. Robert Hunter
Director of Insurance
Consumer Federation of America

Birny Birnbaum
Executive Director
Center for Economic Justice

Cc: NAIC Members
Michael McRaith, Director, Federal Insurance Office
Senator Ben Nelson, Chief Executive Officer, NAIC
Eric Nordman, NAIC
Aaron Brandenburg, NAIC
Representative Greg Wren, President, National Conference of Insurance Legislators
Appendix: What Earnix Tells Regulators versus What Earnix Tells Insurers about Price Optimization

In her March 17, 2014 presentation to the National Association of Insurance Commissioners (NAIC) Auto Insurance (C/D) Study Group, statements and assertions by Earnix’s General Manager in North America Meryl Golden were radically different – and contradictory – to statements and assertions by Earnix about price optimization in advertisements and documents produced by Earnix prior to March 17, 2014. At its essence, Earnix hopes that by calling a risk classification something else – “management discretion” – that a risk classification will somehow be transformed to something else in the eyes of regulators. We have seen this scenario in the past when insurers decided to call rating factors something else – tier placement factors – and then treat the rating factors as underwriting guidelines which then were not filed with regulators. Advising insurer actuaries how to use of “tier placement factors” to avoid filing rating factors with state insurance departments has been a staple of the Casualty Actuarial Society annual Ratemaking and Product Management meeting for many years.

Here are three examples, among many, of Earnix misrepresentations to regulators:

1. Earnix tries to hide the purpose of price optimization as something other maximizing insurer profitability.

Prior to March 17, 2014 Presentation: Earnix promised prospective American insurance company customers that price optimization was a profit-maximizing tool:

“Price optimization is defined as using mathematical algorithms to determine optimal values of rating factors to meet business goals and constraints (e.g., maximizing profitability while achieving X% of policy growth.)”
Source: 2013 North America Auto Insurance Pricing Benchmark Survey

March 17, 2014 Presentation: Price optimization as a tool for profit for profit maximization is a “misconception.”

Misconception: “PO is about profit maximization.”
Correction: In some countries, this is the case.

It is clearly disingenuous for Earnix to indicate price optimization is not about profit maximization. Earnix admits that its tool is used by insurers to achieve certain goals, such as reducing lapse rate while maintaining rates or minimizing lapse rates with a rate increase. These “goals” are simply the means of maximizing profit. In pitching the product to insurers, Earnix was more forthcoming:

In a Best’s Review 2012 advertisement featuring Ms. Golden, Earnix promises “Companies that adopt price optimization realize substantial financial benefits...Late adopters will be at a competitive disadvantage.”
Source: “Price Optimization at the Tipping Point,” Bests Review

Another company document explained: “The financial benefits of price optimization can be significant. Companies that adopt optimization as a pricing strategy can realize improvement of 1-4 points in the combined ratio and/or as much as a 10-20% increase in new business conversion rates.” Source: “Price Optimization in North America: Myth vs. Reality,” September 2012

2. Earnix hides the foundational factor of price optimization – price elasticity of demand or, stated more simply, raising prices for those consumers less likely to shop around in the face of a premium increase.

Prior to March 17, 2014: Earnix has repeatedly touted its product as an advanced predictor of a customer’s likely reaction to price increases – price elasticity of demand. Earnix even referred to price optimization as an “elasticity model.”

Referring to its own report that nearly half of America’s largest insurers “currently optimize their prices,” Earnix claimed that “[t]he most common use of elasticity models is for factor selection, mentioned by 58% of the companies that use such models.” Earnix added that “[w]hen asked to rate the top challenges in their pricing processes, respondents pointed out the following challenges: (1) Effectively incorporating knowledge of consumer price elasticity...” Source: “2013 North America Auto Insurance Pricing Benchmark Survey”

Earnix explained that price optimization allows insurers to “[a]nalyze the price elasticity of each customer profile and uncover the efficient pricing frontier for each product in your portfolio.” Source: Earnix.com “Price Optimization: Insurance Price/Rate Optimization”

“Earnix best-in-class analytics and patent-awarded optimization technology empowers insurers to implement pricing strategies that go beyond traditional risk cost pricing, incorporating demand elasticity models to maximize profit and growth objectives.” (Emphasis added) Source: Earnix.com “Insurance Pricing and Customer Value Optimization”

March 17, 2014 Presentation: The driving force in the price optimization model – assessing individual consumer price elasticity of demand – was not mentioned. Instead, Earnix referred to an analytical model based on “competitive” factors. It was only after a question from a regulator that Earnix admitted that price elasticity of demand was the key factor in their software.
3. **Earnix misrepresented price optimization as something other than a risk classification based on a factor – price elasticity of demand – unrelated to loss costs or other costs associated with the transfer of risk.**

*Prior to March 17, 2014:* Earnix marketed its software as an iconoclastic tool to get past the tradition of actuarially based rates.

Prior to the presentation, the company claimed: “Earnix best-in-class analytics and patent-awarded optimization technology empowers insurers to implement pricing strategies that go beyond traditional risk cost pricing, incorporating demand elasticity models to maximize profit and growth objectives…In today’s competitive insurance market, traditional ratemaking based on risk and cost alone is no longer sufficient. The answer to the needs of insurers in the customer-driven age is incorporating demand and risk cost considerations to optimize pricing and customer value.” (Emphasis added) Source: Earnix.com “Insurance Pricing and Customer Value Optimization”

*March 18, 2014 Presentation:* Earnix now presents price optimization as something outside of the ratemaking process and in the world of management discretion on how close or far from actuarially-indicated rates the selected rates should be. Earnix now tells regulators that price optimization is merely a tool for “suggesting” minor adjustments that “helps inform an insurer’s judgment.”

Additional analysis of the Earnix presentation by CFA can be found at http://www.consumerfed.org/pdfs/CFA-Response-to-Earnix-March17-Presentation.pdf
NAIC Auto Insurance Study Group

Price Optimization

Serhat Guven, FCAS, MAAA

July 28, 2014
Distribution and Use

- This presentation is intended solely for the NAIC Auto Insurance Study Group for understanding price optimization
- The document is incomplete without the accompanying discussion
- It is not intended nor necessarily suitable for any other purpose
Agenda

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Mechanics of Price Optimization

Regulatory Context

Summary, Questions and Discussion
Introduction
Towers Watson offers a range of services across four business segments

We offer practical, tailored solutions in the areas of benefits, talent management, rewards, and risk and capital management.

**Benefits**
- Retirement
- Health and Group Benefits
- Technology and Administration Solutions
- International Consulting

**Risk and Financial Services**
- Risk Consulting and Software
- Investment

**Talent and Rewards**
- Rewards, Talent and Communication
- Data, Surveys and Technology
- Executive Compensation

**Exchange Solutions**
- Private health care benefit exchange for all workforce and retiree populations
- Concierge services for individuals enrolling in a public health exchange
Our Risk Consulting and Software segment serves P&C and Life insurers throughout the US and globally

Services include

- Financial and regulatory reporting
- Enterprise risk and capital management
- M&A and corporate restructuring
- **Product and market strategies, including pricing and predictive modeling**
- Financial modeling and loss reserving software and implementation support
- Integrated consulting and risk transfer via our alliance with JLT Towers Re

Towers Watson Credentials

- We are leaders in risk management innovation
- We advise more than three-quarters of the world’s leading insurers, and we are the industry’s leading risk specialist
- We are the world’s largest provider of actuarial software
With you today

Serhat Guven, FCAS MAAA
Director, Risk Consulting and Software

Relevant Experience/Specialization

Serhat Guven leads the Towers Watson North American P&C Pricing and Product Management group. He has over 19 years of experience in the insurance industry. Prior to joining Towers Watson, Serhat was a senior consultant for EMB after spending nine years in a variety of positions at United Services Automobile Association (USAA), where he was the technical expert on multivariate pricing, demand modeling, classification and tiering analysis, territorial ratemaking and data management.

Serhat's primary area of expertise is developing sophisticated predictive modeling solutions for a wide variety of insurance applications. Particular examples of Serhat's past predictive modeling experience include:

- Price optimization development and implementation projects for large and midsize personal lines insurers
- Multivariate modeling of the insurance risk for small and large personal and commercial lines insurers
- Training on predictive modeling techniques and applications

Serhat is very active on industry and professional committees. He currently serves on the Casualty Actuarial Society (CAS) ratemaking and exam committees.

Serhat has authored several actuarial papers, most recently, “Beyond the Cost Model: Understanding Price Elasticity and Its Applications” (CAS 2013 Winter Forum). He is a frequent speaker on predictive modeling topics at actuarial seminars and meetings.

Education and Credentials

Serhat graduated from the University of Texas at Austin with a bachelors of science in mathematics. He became a member of the American Academy of Actuaries in 2001 and a Fellow of the Casualty Actuarial Society in 2002.
Conceptually, price optimization is not new…

“Selecting a price that deviates from cost-based indications”
Defining price optimization

- Actuarial Standards of Practice acknowledge that companies charge a final price in line with other business objectives
- Selecting a price that deviates from cost-based indications is a standard practice
- Historically, this “optimization” practice has been done purely on judgment
- Modern approaches remove judgmental bias from the process
Modern approaches to price optimization help eliminate judgmental bias

“A process for adjusting prices away from a cost-based benchmark to better achieve business objectives”
Defining price optimization

The “objectives” are embodied in portfolio key performance indicators such as profit, volume, revenue, lifetime value, etc.

The “adjustments” on the cost-based indications typically reflect:

- Profitability
- Price responsiveness
- Price competitiveness
- Long-term customer value considerations
A conceptual overview of price optimization

Use customer knowledge of:

- Risk costs
- Expenses
- Competitive positioning
- Buying behavior
- Retention behavior
- Existing product holdings
- Likelihood to purchase additional products
- Marketing activities

...to improve portfolio performance

- Volume and/or profit uplift
- Sustained long-term improvement
- Align with strategy

...with appropriate controls

- Internal controls (e.g., systems)
- Branding concerns
- Regulatory objectives
A mechanical overview of price optimization

Identify the best rating algorithm reflecting all known information

Business Constraints and Regulatory Objectives

- Competitor Prices
- Demand Models

Profit

- Expenses
- Loss Costs

Search Space

Volume

Optimized Ratebook
Customer knowledge is used to simulate a constrained search space

A search space for one policy constrained by allowable rate change

Different business objectives have different optimal prices

- S1 – Maximize volume
- S2 – Current Rates
- S3 – Cost-based rates
- S4 – Maximize profit

Profit per policy

Retention rate

Expected profit

Premium for policy in question
Constrained search spaces are simulated for each individual policy

 proposedPremium

 retention
eXpected Discounted Contribution

 proposedPremium

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eXpected Discounted Contribution

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 retention
eXpected Discounted Contribution
A wide array of constraints are introduced into the optimization algorithm, reflecting internal and external considerations

- Local policy-level constraints — defined allowable range of premium changes
- Local portfolio level
  - Dislocation
  - Profitability
  - Competitiveness
- Universal
  - The result of the optimization is expressed as a rate order calculation
  - The rate should not be inadequate, excessive or unfairly discriminatory
Explore the simulated search space to identify potential price scenarios.

Optimization identifies and summarizes a range of options in the search space — it is not just about increasing profit.
A price scenario is identified to align with portfolio-level objectives

- Resulting tables of selected factors for the rate order calculation are outputs that accurately align with objectives:

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Base $445
Regulatory Context
How does the role of the regulator change?

The regulatory process remains the same: “Rates should not be inadequate, excessive or unfairly discriminatory.”

- Optimization is a tool that guides the selection
- No easy way to see if a company is or is not using the tool
- Goal is to ensure selection is in line with regulation
Selections can still be compared to indications

- This selection is likely to be acceptable
Is the selection in line with the indication?

- This selection is likely to be challenged
Complexity in risk models requires a more holistic view to understand impact of all selections...

Goal is to gain insight on overall impact

- Compile the rate factor selections and compare current to proposed price to identify dislocation

![Proposed vs. Current Price](chart.png)
Complexity in risk models requires a more holistic view to understand impact of all selections...

Additional metrics can be used to assess performance

- By comparing to the cost model, the regulator can assess subsidization change

![Expected Loss Ratios Underlying Current and Proposed Prices](chart.png)
Summary

- Historically, actuaries have made selections that deviate from indications and are not inadequate, excessive, or unfairly discriminatory, but this has been a judgmental process.
- Price optimization is a scientific approach to rate selection, attempting to eliminate the bias in traditional judgment.
- The role of the regulator continues to ensure that the selections are actuarially justified.
To: Joseph Murphy, Chair  
Auto Insurance (C/D) Study Group  
c/o Aaron Brandenburg, NAIC  
(Via email to ABrandenburg@naic.org)

Re: Towers-Watson Presentation Regarding Price Optimization

Dear Commissioner Murphy and Members of the Study Group:

Thank you for allowing us to submit comments and questions related to the Towers-Watson presentation of July 28, 2014 before the Study Group.

This letter first presents our comments on the presentation followed by questions we request that you ask of Towers-Watson.

**CFA COMMENTS ON THE TOWERS-WATSON PRESENTATION**

In the presentation, Mr. Guven defined price optimization (PO) this way: “Price optimization at its heart is selecting a price that deviates from cost-based indications. That’s it.” He also pointed out that if the objective in setting prices is to minimize subsidy, “I want to follow my cost model. I don’t want to deviate from that (cost-based) indication. I want to minimize subsidization.”

Throughout the history of property/casualty insurance ratemaking in America, insurers have insisted that their rates are cost-based and that to introduce subsidies would be inappropriate. Yet, departure from cost-based prices and introducing subsidies into the rates are at the heart of PO, according to Towers Watson (TW).

PO is something new and dangerous, untethering prices from cost and exposing consumers, required to buy auto insurance by the states, to unfettered price gouging.

Central to Mr. Guven’s presentation on behalf of TW are two assumptions with which I disagree both as an actuary and as a former regulator. The first problematic assumption is that PO is allowed under the current Casualty Actuarial Society Statement of Principles Regarding Property and Casualty Insurance Ratemaking. The second, and broader, assumption is that PO is merely a technological improvement upon current practices in which companies deviate from cost-based
indications. Understanding the problems with these assumptions sheds important light on the serious and unfair impacts of the use of price optimization techniques by auto insurers.

**False Assumption 1: Price Optimization is allowed under the current CAS Statement of Principles (SOP) Regarding Property and Casualty Insurance Ratemaking**

The TW presentation suggested that actuarial standards of practice allow for pricing that deviates from cost-based prices. As is discussed in greater detail below, such deviation historically has been, almost without exception, downward. More importantly, the type of deviations presented by TW directly conflict with the principles of the Casualty Actuarial Society (CAS).

The current ratemaking standards clearly relate only to estimating future costs. For example, one principle is "a rate is reasonable, not excessive, not inadequate or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs." Further, the SOP allows data other than "historical premium, exposure, loss and expense experience" to be used only if those data indicate "the general direction of trends in insurance claims costs, claim frequencies, expenses and premium." (i.e., data to inform various trend factor selections).

Varying from the best estimate of cost-based rates according to factors unrelated to risk violates this standard. For example, data on elasticity of demand, a key component of PO, cannot be used under the current SOP since it does not inform us on trends. Indeed, the purpose and formulations of PO cannot be reconciled with the standards of the actuarial practices, which is why a CAS seminar entitled "Price Optimization vs. Actuarial Standards" was held on May 21, 2012.1 This tension between current actuarial standards and the emerging use of PO has led to a faction in the CAS pushing to rewrite the principles underlying our profession at the behest of firms that sell price optimizing products and the insurers that want to use them.2

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1 The slides for that presentation include such questions as: “Is it in compliance with Statements of Principles (SOPs) and Actuarial Standards of Practice (ASOPs)? SOPs and ASOPs refer to ‘costs.’ Do costs only consider losses and expenses? Or do they include the effects of demand elasticity and competition?” “Principle 1: A rate is an estimate of the expected value of future costs.”’Principle 2: A rate provides for all costs associated with the transfer of risk.’ ‘Principle 3: A rate provides for the costs associated with an individual risk transfer.’ – Does this mean that Price Optimization is NOT ratemaking? – Are all considerations other than cost-based NOT ratemaking? – Is there a difference between ratemaking and premium development?”

2 CAS tried to change the SOP to allow PO last year but reconsidered after I raised the issue, CASTF balked, and California Commissioner Jones wrote that it would be illegal to use PO in California. CAS is once again proposing to change the SOP to allow PO. Towers Watson’s presenter before this committee, Mr. Guven, is on the Ratemaking committee of the CAS, so he is undoubtedly aware of the conflict between the current Principles and PO. CASTF forwarded comments to the CAS on the new draft, which again questioned the language since it appears to allow PO under the proposed SOP.
False Assumption 2: Price Optimization is merely a technological updating of, and improvement upon, existing deviations from cost-based indications

The TW presentation suggested that PO simply removes bias from a presumed current practice of selecting prices that deviate from cost-based indications. The impact of PO – at the individual consumer level – is significantly different than current practices. The vendors of PO products sell their algorithms to insurers on the promise of higher profits tied, at least in part, to the ability to increase prices above cost-based levels on certain types of consumers. PO clearly raises prices above the cost-based level when elasticity of demand calculations indicate that a consumer is unlikely to shop.

I have reviewed thousands of rate filings in over 50 years as an actuary and I have never seen an insurer get approval from the regulator for a systematic increase in rates that are higher than the indications. Perhaps Towers-Watson can point us to examples of a scheme of rates selected that were higher than the cost-based indications, filed by an insurer, and approved by a regulator. The only two sorts of deviations from cost-based rates I have seen in rate filings are when a very large increase or decrease in a class or territory is capped so that the increase/decrease is not too much of a shock to the buyers or a downward adjustment to the indication is requested by the filing insurer on a specific territory rate for competitive reasons.

PO, quite distinctly, offers insurers strategies for increasing profit by systematically increasing premiums without any risk-based justification, as the TW presentation illustrated on slide 15. PO is a systematic way to raise prices on those who shop less often (including, sadly, the insurer’s most loyal customers) so that profits of the insurer can be enhanced. This sort of systematic upward adjustment of rates above the cost-based indications has never been done in the history of insurance ratemaking to my knowledge. PO is a brand new abuse regulators need to deal with, not the continuation of the same old actuarial judgments as TW alleges.

Regulation of Price Optimization is difficult, if even possible.

On Slide 21 of the TW presentation is this telling statement in their discussion of regulation: "No easy way to see if a company is or is not using the tool." This opacity should alarm members of the Study Group. With no way to know an insurer’s pricing methodology, it is not difficult to imagine an insurer using price elasticity data based on race and then matching it to ZIP Code demographics to optimize rates.

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3 “Companies that adopt price optimization realize substantial financial benefits. These companies see improvement of 1-4 points in the combined ratio...” Price Optimization at the Tipping Point, Advertisement by Earnix pitching their PO product in Best’s Review Magazine, 2012.
4 Mr. Guven stated clearly that an insured with the insurer for “15 years” was more likely to stay with the insurer at renewal than a new customer.
by ZIP Code. Assuming Mr. Guven agrees it would violate a variety of rules and laws to use race-based pricing strategies, he should explain how a regulator would be able to identify such illegal pricing methods given his stated view that how the algorithms are derived is “not germane” and that only the end result (not the methodological means) matters in ratemaking. A similar concern was noted during the CAS PO seminar of October 2012, during which the panelists agreed regulators were at a "terrible disadvantage" in determining the impact of PO. At that time, I asked panelists representing insurance companies if there was a duty to warn regulators about the use of PO. They said "no."

This deliberate lack of disclosure also violates Actuarial Standard of Practice 41, “Actuarial Communications,” which states “In the actuarial report, the actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report.” No actuary could figure out how PO was used in a filing today since the filers are purposefully keeping PO behind a curtain of secrecy. If this PO “innovation” is a good thing and something to be proud of, why are the insurers hiding it from the regulators?

**Use of elasticity of demand as a rating factor is per se unfair discrimination**

One’s shopping habits, or willingness to forego a purchase, do not differentiate one insured from another from a risk of loss perspective. Therefore, any use of elasticity of demand to alter rates between customers or groups of customers who are otherwise similar risks should be prohibited as illegal unfair discrimination. Indeed, Mr. Guven’s revelation that under some PO models customers could pay higher premiums simply because they had not complained about their insurance policy or because they were loyal customers or because they purchased their policy through an agent rather than the internet would anger any policyholder (and policymaker as well).

It is well understood by regulators that the mandatory nature of auto insurance makes insurance different than a normal competitive product. The demand for auto insurance is severely inelastic, particularly for the poor forced to purchase state-required minimum limits. It should be, in our view, among a regulator’s highest priorities to protect his or her state’s citizens from paying more than the cost-based price for insurance that the state requires drivers to purchase.

**The use of a confidence interval rather than a point estimate is not appropriate**

The TW presentation is very clear that PO is “A process for adjusting prices away from a cost-based benchmark to better achieve business objectives” (Slide 10). The
only caveat to this surprising move away from actuarially sound pricing is that these adjustments are acceptable so long as they stay in some (unidentified in rate filings) range of reasonableness (the statistical confidence interval). According to Slide 9, this interval of choice is two standard errors (i.e., two standard deviations) away from the mean cost estimate.

There are several reasons why regulators should reject such an approach, including:

- By definition, the point estimate (the mean of the distribution) is the best estimate available;
- Moving away from the cost-based indication introduces subsidies and cross subsidies in the rate as Mr. Guven acknowledged during his oral presentation. He stated that if the objective is zero subsidization in the rating system the actuary should “select the indication” of the cost-based analysis (i.e., the traditional ratemaking approach). By definition, PO leads to unjustified subsidization, which is unfair discrimination;
- No other point in the confidence interval is as valid an estimate as the traditional point estimate. (e.g., the further the actuary goes out away from the mean (point estimate) in selecting factors or prices toward the outside edges of the interval, the more likely you have selected a number that is invalid);
- Confidence intervals vary in size depending on several factors such as the size of the sample and the choice of the confidence percentage;
- The width of the confidence interval approaches infinity as the sample size decreases toward zero, which will happen as insurers consider more and more variables. With insurers using hundreds of rating factors and tiers, this is a significant problem. (On top of that, Mr. Guven noted that some demand models “can have hundreds of characteristics in them with lots of interaction”);
- Confidence interval width is subject to manipulation by choices made by the actuary;
- Confidence intervals are impossible to regulate (they are not filed, there is too much discretion in how the interval is constructed, etc.);
- There is a confidence interval around each of many rating factors. Bias in selecting within a range can cause great impacts in final rates, calculated by multiplying these factors together, requiring regulators to study much more detail than currently is required; and
- The confidence interval surrounds an indication that is often already the product of a modeling exercise. The days of adjusting historical losses to future expected losses with frequency and severity trends are long gone; claim costs are often modeled using assumptions about frequency and severity distributions with a multivariate generalized linear model.

Not all estimates within the range are reasonable
Above is a graph of a probability distribution, a normal distribution, which shows the likelihood of the actual estimate being within one, two and three standard deviations away from the mean as approximately 68%, 95% and 99.7%, respectively. If, for example, the actuary chose a point that Mr. Guven chose, two standard deviations above the mean, only 2.275% (1/2 * [100.00% - 95.45%]) of the entire distribution is in the tail to the right of that selection. It is clearly unreasonable to be pricing near the tails of the distribution instead of at the point estimate, which is the mean and best estimate.

Consider the example Towers-Watson used showing a confidence interval range of $400 to $600 around a point estimate of $500 (Slide 15). It is impossible for a price of $600 to be as reasonable an estimate of expected claims as a price of $500. But the argument of those selling Price Optimization packages seems to be that every point in the confidence interval is equally valid as an estimator. If regulators accept that argument, then we must ask the obvious question: “Why should a regulator allow a price higher than the low end of the confidence interval for this legally mandated insurance product when the lowest rate in the interval is as equally valid as any other choice in the interval?

Slide 9 gives a clear picture of how PO can be used to exploit this proposed application of confidence intervals. The light green lines are 2 SEs (Standard Errors or Standard Deviations) from the point estimate (the mean). Note that the optimized points are all equal to or higher than the indicated points, making this a very honest presentation of what is likely to happen in practice. Mr. Guven said the X-Axis points are rating factors. Thus, if these factors were applied to an insured, the final answer from multiplying the factors would be much higher than the indicated since many of the factors are inflated. For example, the factor identified as “17” has an indication of about 7, an optimized selection of about 10.5, and the range of SEs is about 2 to 12, (the mean plus or minus 5 points). Selecting a confidence interval of 2 SEs allows the factor to be raised in this example by 50% (10.5 divided by 7). This is clearly an unreasonable departure from the indicated, cost-based factor and is an unfairly discriminatory selection in my opinion. And this is only one
selection of a rating factor above the indication. As Slide 9 reveals, several other factors were selected above the indication. Imagine the impact on a particular insured when several of these higher than risk-based rating factor selections are multiplied together to arrive at the final rate.

The claim that PO is not a rating factor is untrue.

In arguing against both regulatory oversight and PO transparency, Mr. Guven said in his oral presentation that a “retention score” is not a rating factor in the USA unless it is correlated with loss costs. The claim of price optimization proponents that PO is not a rating factor is belied by the fact that it is applied on a systematic basis at the individual policy level based on demand scoring models. So, as Mr. Guven explained, complaining will impact your score as would your coming to the insurer via the Internet as opposed to through an agent. The score based on these factors will impact your price; it is undeniably a factor that impacts rating.

P.O. is a rating factor called something else, reminiscent of insurers using rating tiers to avoid disclosing the underlying rating factors they used. The fact that the PO factors are unrelated to expected losses makes the factors per-se unfairly discriminatory, but it does not transform the PO factors into something other than a rating factor. A rating factor is a characteristic of the consumer, vehicle or property used to determine premium -- whether it is related to claim costs (like an accident) or not related to claim costs (like calling the insurer to complain).

QUESTIONS TO ASK TOWERS-WATSON

CFA proposes that the following questions be posed to TW:

1. How is a commissioner going to assess the impact of price optimization unless he or she can review the models or, at least, a tabulation of the effect by rating factor and the aggregate effect for at least enough drivers to understand the overall impacts?

2. Slide 9 states: “Actuarial Standards of Practice acknowledge that companies charge a final price in line with other business objectives.” Historically judgment and competition are typically used to explain the selection of lower than indicated rates, and this is disclosed to regulators. Can you show examples of a filing where an insurer systemically raised rates above the indicated rate, informed the insurance department of that, and received approval of such a selection?

3. If price optimization moves the rate away from the traditional risk-based rate isn’t that per se unfairly discriminatory? How do price optimization techniques ensure that two otherwise identical risks are not charged a different price (either in the rate table or tier placement) based on non-risk related factors? Please provide a real-world example of the process
that guarantees that no identical risks are charged a different rate or placed in either a different tier or a different insurer.

4. In your oral presentation you stated that the selection of the point estimate (the mean of the distribution) should be made if the objective of the filer is to have “no subsidy.” In other words, to use other than the traditional cost-based indication introduces subsidies into the rate structure. Why don’t the subsidies and cross-subsidies produced by PO result in unfair discrimination?

5. Do you believe that small overcharges to consumers (above the risk-based mean of the distribution levels) meets regulatory standards but large ones, using the same methods, would not? Where is the point at which the increase fails to meet the standards? Is it, as slide 9 suggests at two standard deviations from the mean?

6. How does TW assure that rates are not raised on the basis of income either directly or through proxies for income? This is particularly important to know since lower-income Americans are having trouble affording state required auto insurance and regulators need to know if lower-income people will be adversely impacted even further by price optimization.

7. During your presentation, you did not mention price elasticity of demand even though it is discussed extensively in other TW documents. Does your algorithm include evaluation of consumers’ responsiveness to price changes? If so, under your algorithm, would a consumer (or class of consumers) found to be less responsive to price changes be identified for upward adjustments in premiums? How do you determine consumer (or class of consumers) responsiveness to price?

8. Has TW ever tested price elasticity by race or ethnicity? Have you tested it by income? Would it be OK to use race or income as a basis for your rate segmentation? Would it be OK to use proxies for race or income as a basis for your rate segmentation?

9. Since price optimization is marketed as a technique to increase profits for the insurer, are higher prices produced by price optimization excessive since they derive from prices above the indicated cost-based price?

10. If, as you say, the regulatory process for price optimized rates and non-price optimized rates “remains the same” and the regulator has “no easy way to see if a company is or is not using the tool” (Slide 21) how does a regulator determine if the rates being presented are optimized or not?

11. Do you advise your clients to be sure to disclose to the regulators that
your products have been used to optimize the rates being filed or do you advise them not to disclose it? Please supply documentation of any advice you give clients regarding the disclosure of information to regulators related to insurers’ use of price optimization.

12. Do you advise your clients or the insurer producers to be sure to disclose to their consumers that your products have been used to optimize the rates being filed or do you advise them not to disclose it? Please supply documentation of any advice you give clients regarding the disclosure of information to consumers related to insurers’ use of price optimization.

13. Please provide the manual or other information you supply to insurers when they decide to use your price optimization product. This should cover not only the advice you give insurers on how to run the software but any advice you give them relative to how to interact with regulators and consumers when asked questions about the product. Do you ask to be involved if a regulator asks one of your clients about your price optimization product? Also, do you in any way restrict the insurers’ ability to disclose if and how price optimization is used when a consumer asks if it is used? Please supply all documents relative to this as well.

14. Is the place where rates are optimized in America always in a rate filing or is it, in some cases, in underwriting standards or in alternative product selection or at the point of sale? Please identify with precision all of the ways price optimization can be used to alter a price from the risk-based level in the United States. In places with so-called “open competition” laws, like Illinois, does TW use a different price optimization model than in a place with tighter regulation, such as California? Please explain for each regulatory regime (prior approval, file and use, use and file, flex and open rating) how the TW model changes if at all.

15. Please give us examples, based on your experience, of segments most likely to be optimized upward in price. Describe in detail a series of characteristics that would lead a customer’s premium to be increased as a result of optimization?

16. Explain in detail the process of reverse engineering the prices in a rate structure to change them from risk-based to optimized. Is this reverse engineering ever disclosed in a rate filing? If so, please provide examples of filings where it was disclosed.

17. Should vendors of price optimization products be regulated as advisory organizations since their tools directly alter prices consumers pay for state required auto insurance?

18. Is territory one of the factors that price optimization uses in determining
optimized prices? How does the TW optimizer protect the public from the possibility that price optimization could be used to “redline” territories through high prices not justified on a risk-basis?

19. Do any factors used in a price optimization algorithm overlap with factors used in the traditional risk-based rating process such as territory or type of vehicle. For example, driving a Volvo might lower a premium based on the risk-based factor “vehicle type.” But what if a price optimization tool uses vehicle type as a measure of elasticity and finds that a Volvo buyer is unlikely to shop around and thereby subject to an upward adjustment? In other words, is it possible that the impact of an optimizing factor increases or decreases the impact of the rating factor?

20. At slide 15, there is discussion of “a search space for one policy.” At slide 16, the caption is “Constrained search spaces are simulated for each individual policy.” Is this application of PO to each specific auto insurance policy in an insurer’s portfolio done anywhere in the USA? If used in this way, how can rates that vary between individuals based on changes in demand elasticity pass muster as not being unfairly discriminatory?

21. Research suggests that low- and moderate-income auto owners might be struggling with affordability of state-required auto insurance. Since research by Brookings and others indicates that the poor do not shop as much as other consumers for financial services products, isn’t it likely that price optimization will make state-required auto insurance even more unaffordable for the poor in America? Please identify any steps the T-W model takes to mitigate PO impacts on low- and moderate-income policyholders.

**Conclusion**

CFA is certain that price optimization will undermine actuarially sound pricing and produce illegal, unfair rates. We call upon the NAIC to ban its use. This Study Group has an important obligation to warn all of the state insurance departments of the dangers of PO and the fact that many insurers are already using PO, albeit without revealing it to regulators. As such, insurance customers all across the nation are already being harmed by this opaque and insidious practice.

Sincerely,

J. Robert Hunter, FCAS, MAAA
Director of Insurance
The Auto Study Group has received lengthy presentations by Earnix and Towers Watson describing price optimization and explaining, in their view, why price optimization is not a rating factor and, consequently, not subject to regulatory oversight. The purveyors of price optimization services for insurers make the following points:

1. Insurers have always deviated from indicated rates for a variety of competitive and business reasons, relying on management judgment for such deviations. PO is simply a more scientific, data-driven approach to employing such management judgment.

2. Rating factors are factors related to costs of transfer of risk – loss costs or expenses. Since PO is not related costs of transfer of risk, it is not a rating factor and, consequently, not subject to regulatory oversight.

3. There is a statistical confidence interval around the indicated rate and any selection based on management judgment within that confidence interval is actuarially sound.

Each of these contentions is clearly erroneous. Demonstrating the falsehood of any one of these assertions renders PO illegal and unfair under current statutory rate standards. Clearly, demonstrating the falsehood of all three should make clear that regulators should take immediate action to stop PO under existing regulatory authority.

Insurers have historically and routinely deviated from indicated rates and PO is simply an extension of this historical practice.

It is correct that insurers have deviated from indicated rates in the past, but that deviation has not been anything like PO. Historical deviation from rates has typically been an insurer selecting a lower rate than the indicated rate. Regulators have not routinely approved insurer requests for, say, a 20% rate increase when the insurer’s indication is for a 5% rate increase. Historical deviation from indicated rates has almost always been a lower selected than indicated rate and the lower selection has been across broad risk groups. For example, the indicated rate change is +20%, but the insurer selects a base rate increase of 5%.
PO is new on both quantitative and qualitative bases. It employs consumer-specific information to deviate from indicated rates not by broad risk groups but by individual consumer and those deviations are as likely or more likely to be higher than indicated rates than lower than indicated rates.

The engine of PO is price elasticity of demand – meaning the rate charged is dependent on the consumer’s likely response to a higher rate. PO means that an insurer will charge a higher rate to a consumer for whom the PO scoring model indicates the higher rate will not prompt the consumer to shop for insurance from other providers. This is not a symmetrical exercise in which some consumers will see lower rates while other will see higher rates. PO is optimization of price to maximize profit so higher prices will be assessed on these consumers the insurer believes will accept prices greater than the expected and indicated cost of the transfer of risk.

Insurers’ definition of a rating factor has historically been fungible to justify shielding their practices from regulatory oversight.

Historically, there was a clear demarcation between underwriting and rating factors. Underwriting utilized very few and simple criteria to determine if an insurer would offer coverage and, if so, in which company – during a period in which insurers might have one company (and one set of rates per company) for preferred, standard and non-standard underwriting evaluations. Rating factors were any characteristic of the consumer, vehicle or property used to determine the premium charged for an individual policyholder. Historically, underwriting was left to insurer and not subject to routine regulatory oversight, while regulators did require the filing of rating manuals and reviewed those rating manuals for compliance with the statutory requirement that rates not be unfairly discriminatory.

Around the time of introduction to credit scoring, some insurers figured out that if they took a rating factor and use that rating factor to create different base rates, then they could call the rating factor a tier placement factor, declare it as part of underwriting and not tell regulators about. So instead of using credit score as a rating factor with, say, relativities of .75, 1.0 and 1.25 (reflecting a discount of 25%, base rate and a surcharge of 25%) the insurer could call credit score a tier placement factor and have three sets of base rates: 25% below the average, the average and 25% above the average.

Clearly, this approach was an effort to avoid regulatory scrutiny. For many years, there have been sessions at the Casualty Actuarial Society’s Annual Ratemaking Seminar instructing company actuaries how to utilize “tier placement” to avoid regulatory scrutiny.

Given this history, is it reasonable to ask if PO is another effort by insurers to avoid regulatory scrutiny by simply calling a rating factor something else? And the answer is yes.
At this point, it is necessary to have a definition of rating factor. A rating factor is any characteristic of the consumer, vehicle or property utilized by the insurer to determine the premium charge. Rating factors must be risk classifications to comply with statutory rate standards; that is, a rating factor must related to expected costs of the transfer of risk – expected losses or expenses to issue and administer the policy.

By this definition of rating factor, PO is clearly a rating factor as it is based on individual consumer characteristics and is applied to individual consumers to determine the premium charge for that consumer. At once, it is now obvious that PO is an impermissible rating factor because it is not related to the cost of transfer of risk, as admitted by both Earnix and Towers Watson.

Simply stated, the definition of a rating factor must be a constant and not subject to re-definition any time insurers want to introduce new pricing methods without regulatory oversight.

The concept of a confidence interval around indicated rates misapplies a statistical concept to insurance ratemaking and regulation. The confidence interval is a function of choices made by the insurer in specifying the rate development model and, consequently, is subject to manipulation. It is incorrect that any rate within the confidence interval is as reasonable an estimate of the expect cost of risk transfer as the indicated rate.

A confidence interval is created around the output of a statistic or statistical model. The size and nature of the confidence interval is determined by inputs chosen by the modeler, including the type of probability distribution used and the size of the data set used (e.g., number of observations), among many other factors. Consequently, the size and nature of a confidence interval – like the results of the underlying ratemaking model – can be manipulated by the insurer.

In the Towers Watson presentation, an example was given showing an indicated rate of $500 and a confidence interval of $400 to $600. It is incorrect that a rate of $599 is as good an estimate of the expect cost of transfer of risk as $500.

Given that the size and nature of confidence intervals (as well as the results of the underlying ratemaking model) are subject to manipulation based on selected inputs and data and given that it is incorrect that any rate within an alleged confidence interval is as reasonable an estimate of the rate as the indicated rate, this third pillar of the PO justification crumbles.
While there are many issues within the world of insurance regulation that reasonable people can disagree upon, surely PO is not one of them. PO is clearly related to lessened auto insurance affordability for low- and moderate-income consumers.

As I wrap up, I ask regulators, do you accept all three pillars of insurer justification for PO?

If no, why haven’t you taken action?

If yes, how do you respond to the points raised by CEJ, CFA and others? I hope you will take the time during this meeting to explain why you accept the industry arguments.

The final thought I will leave you with is that PO means higher prices predominantly for those low- and moderate-income consumers least able to afford auto insurance because these are consumers living in communities with the least competition among auto insurer for business. PO means taking advantage of those with the fewest alternatives. Addressing PO is not only an issue of enforcing existing statutory standards regarding unfair discrimination, but also an issue essential to promoting greater affordability of insurance among those consumers for whom the cost of auto insurance is the greatest burden.
Dear Commissioner Murphy,

We appreciate the opportunity to respond to the NAIC’s Auto Insurance Study Group’s questions concerning price optimization and our presentation on the use of statistical techniques in the rate setting process. At the outset, we would like to make a few main points:

- Earnix sells a software platform that enables insurers to utilize statistical techniques in the rate setting process. Earnix does not provide any data to customers nor does it give any advice on the development of loss costs, rate filings or other regulatory matters;
- The term “price optimization” was coined in Europe where in some countries insurers use our software to price individual risks in markets with a different type of regulatory system than the U.S. In the U.S., our software is used as a competitive rating tool that is subject to an insurer’s constraints, including actuarial standards and regulatory requirements;
- Price optimization is not used to determine the actuarially indicated (cost based) premiums. Instead, applied statistical techniques suggest adjustments, both higher and lower, to the cost based factors that help inform an insurer’s judgment when setting their rate plan;
- Insurers generally deviate from the actuarially indicated premiums for competitive purposes whether they use optimization techniques or not. This deviation is, to some extent, based on a prediction of how customers and prospects would respond to the rates and rate changes and includes a measure of price elasticity. This is a common practice in the insurance industry and has been for decades;
- No insurer uses optimization techniques to modify filed/approved rates for individual risks. Optimization software is used to develop the rates that are then filed for approval;
- It is not possible for two otherwise identical risks that would have been charged the same premium before applying optimization techniques to be charged different premiums after applying optimization techniques;
- The U.S. personal auto insurance market is extremely competitive with insurers spending multiple billions advertising for new customers primarily based on price. Auto insurance is more widely available and affordable then it has been in decades. The use of advanced analytic techniques, like price optimization, has contributed to these competitive market conditions.

For purposes of responding to your questions, we have taken the liberty of grouping similar questions together.

**Price Optimization Model and Usage**

**How does Earnix define price optimization? What items are modeled (e.g. retention, demand elasticity, etc.) and what variables do you incorporate for your model output?**
Please identify all risk attributes that are incorporated into price optimization models that are not currently recognized in traditional cost based rating plans.

Please identify the source of the risk attributes information used in price optimization models that are not customarily used in traditional cost based rating plans.

Earnix defines price optimization as a systematic and statistical technique to help an insurer determine a rate plan that better fits the competitive environment, within actuarial standards and regulatory requirements. Inputs to the optimization software include the company’s goals, its constraints, expected loss costs and expected expenses, an insurer’s model predicting the probability of retention, an insurer’s model predicting the probability that a new business quote will convert to a policy and sometimes, an insurer’s model predicting whether a policy will cancel before the end of the term. Typical inputs to retention and conversion models generally include but are not limited to premium, change in premium, an indicator of whether the policy renewed or the quote converted, distribution channel, many of the variables used for rating (such as a multi-car indicator, a multi-policy indicator), some measure of competitor rates or competitive position and some payment plan information (such as the down payment or number of payments). The output of the optimization software is suggested competitive adjustments that will better enable the company to determine a rate plan that achieves its business goals subject to its constraints, including actuarial and regulatory standards.

To the best of our knowledge, our customers do not use any risk attributes when setting their prices that are not currently recognized in traditional cost based rating plans. Earnix does not provide any data to its customers. All data used to set prices is the customer’s own data.

How many U.S. auto insurance companies has Earnix provided services for? What percentage of the market does this represent?

We are contractually prohibited from disclosing the names of our customers.

Do some insurers use Earnix tools before rates are filed while others use Earnix tools after the rates have been filed, i.e., to modify an individual insured’s premium using the insurer’s filed/approved rates? If so, please provide the numbers for each category.

In the U.S., 100% of our insurance customers use the Earnix software to develop the rates that are then filed for approval. No insurer uses Earnix software to modify an individual’s premium after the rates have been filed and approved.

Does Earnix know approximately how many auto insurance companies use price optimization for business written in the U.S.?

Does Earnix know approximately what percentage of the auto insurance market uses price optimization in the U.S?  Is Earnix able to split this percentage between personal and commercial auto?

We do not know how many auto insurance companies use price optimization for personal lines pricing in the U.S. However, Earnix conducted a personal auto insurance pricing survey in 2013. Of the 73 respondents from the U.S. and Canada, 26% indicated that they use price optimization today and an additional 36% said they were likely to start using price optimization in the near future. Companies with more than $1 billion in auto insurance premium were more likely to use price optimization techniques. This was not a scientific survey and responses were not validated. Earnix does not have any data on commercial auto.
In addition to price optimization, does Earnix know how many auto insurance companies (and what percentage of the market) uses elasticity of demand in pricing and how many/what percentage uses competition in pricing?

Earnix does not know how many auto insurance companies use elasticity of demand in pricing or how many use competition in pricing. In the personal auto insurance pricing survey conducted by Earnix in 2013, 55% of the 73 respondents from the U.S. and Canada indicated that they use elasticity of demand in pricing and 72% indicated that they consider competition in their pricing. Again, this was not a scientific survey and responses were not validated.

What are the various methods insurers use to incorporate price optimization in determining the premiums that they charge? In what way do they vary between personal and commercial lines, and among the various types of personal and commercial lines of business?

What are the various methods insurers use to incorporate price optimization into their rate schedules, such as underwriting, marketing, claims, reserving?

In what ways, other than to determine premiums to be charged, do insurers use price optimization? Explain how price optimization is used in each. In what way do they vary between personal and commercial lines, and among the various types of personal and commercial lines of business?

Our customers in the U.S. are using the Earnix software solely to determine a rate plan (e.g. factors and base rates) that better fits the competitive environment, subject to certain constraints including actuarial standards and regulatory requirements. We are not aware of any of our customers using the Earnix software for underwriting, marketing, claims, reserving or any purpose other than to determine a rate plan.

Does Earnix’s algorithm include an evaluation of consumers’ responsiveness to premium levels or premium changes? If so, how does Earnix determine consumer (or class of consumers) responsiveness to premium levels or premium changes? If market premiums are considered in evaluating consumer responsiveness, how is market premium information obtained and verified that it is current and accuracy?

What are the categories you use to identify who shops more or less than average?

Does Earnix maintain data on individual customer’s shopping habits?

The Earnix software does not include data on individual customer’s shopping habits or an evaluation of consumer’s responsiveness to premium levels or premium changes. These predictive models are typically built by our customers using their own data. The models generally used are standard regression models (e.g. Logistic Regression) that are part of all statistical software. Such models use historical premium changes and the historical result (whether the customer purchased a policy or not at the price offered) along with other factors such as distribution channel, variables used for rating (such as a multi-car indicator, a multi-policy indicator), usually some measure of competitor rates or competitive position and some payment plan information, such as the downpayment or number of payments.

Earnix does not provide any data to its customers. Many insurers attempt to measure market premiums as part of their rate setting process. This is done a number of ways including purchasing competitor premiums from data vendors, asking agents for this information, analyzing competitor rate filings and building comparable rating.
structures internally. The insurance company can choose to include this information in their predictive models or not.

**How is the ‘degree of consumer responsiveness’ used in Earnix’s pricing algorithm? Would a consumer (or class of consumers) that is found to be less responsive to price changes be identified for upward adjustments in premiums?**

The Earnix software does not include an evaluation of consumer’s responsiveness to premium levels or premium changes. This information is provided by our customers using their own data and is then used as an input to our software. The degree of consumer responsiveness is only one of the many factors that determine whether there is an upward or downward adjustment to premium. Other factors include the company’s business objectives, any self-imposed constraints, profitability by segment, regulatory requirements, actuarial standards and judgment.

**Has Earnix ever tested its model against variables that may be correlated with race, ethnicity, credit history or income? If yes, what were the results? Is race, ethnicity, or income considered in Earnix’s algorithm? Does your research show the degree of shopping for categories of consumers based on these categories?**

The Earnix software does not consider race, ethnicity or income. Earnix has never tested its software or conducted any research concerning the use of any variables that may be correlated with race, ethnicity or income nor are we aware of any of our customers doing so.

**How stable are the variables in a price optimization model, and how would insurers be able to keep their models current?**

We assume that your question is about the stability of inputs used by insurers and particularly the models predicting the probability of retention or conversion. Earnix recommends that companies continually monitor their models to ensure they are still predictive and that the data used to build the model be refreshed at least quarterly.

**How, if at all, does Earnix’s price optimization algorithm vary by state?**

**Has Earnix changed its price optimization model due to the rating laws for a particular state? If so, what changes were made?**

The Earnix software does not vary by state. All of our U.S. customers use the identical software platform for every state. Our customers may incorporate the rating laws of a particular state by limiting the inputs that can be considered and the acceptable variations in rating parameters.

**How would Earnix describe the quality of competition in countries where price optimization is prevalent?**

Many factors determine the quality of competition in a given country including the size of the insurance market, the number and size of competitors, the regulatory scheme, the economic viability of the country, among other things. Recent studies have suggested that the U.S. auto insurance market is one of the most competitive. The U.K. is another example of a highly competitive market and price optimization is a common practice. We believe that the use of optimization techniques has contributed to the competitiveness of countries where price optimization is prevalent.
Please explain how consumer propensity to shop for insurance is consistently related with their driving behavior.

The consumer’s propensity to shop is not included in the calculation of loss cost models which are used to predict driving behavior. The consumer’s propensity to renew their policy or convert their quote to a policy is an input to the Earnix software from the insurer’s own data.

Does Earnix believe that there is a range of reasonableness, or confidence interval, around the rate calculated in the traditional actuarial (cost-based) way? If so, are insurers free to charge whatever they want in that range? Is the range submitted to the regulator in the filing?

If the range is used to alter the price through price optimization, should the insurer be required to tell the regulator what it did and submit the range and how it was calculated as part of the filing?

Does the range vary from class to class? Does a class with a lot of credibility to the data have a narrow range and a class with low credibility have a wider range?

If an insurer increases the number of classes, dropping the credibility in each class, does that give the insurer the right to raise rates more through price optimization than an insurer with a more stable rate system? If a class has zero credibility, can the insurer pick any price it wants?

Does Earnix believe that small rate increases (above risk-based levels) meet regulatory standards but large ones, using the same methods, would not? Does this vary based on the credibility of the class being price optimized?

Earnix does not set rates for insurers. We provide a software platform that enables them to utilize statistical techniques in their rate setting process.

In statistics, a confidence interval is a measure of the reliability of a point estimate and the size of this interval is based on the variability of what is being predicted, the accuracy of the prediction and the amount of data used to make the prediction. All modeling has some confidence level associated with its predictions.

Confidence intervals have nothing to do with an optimization exercise per se. However, insurers sometimes set constraints on the movement of any factor to the range of the confidence interval so that they can be sure that the resulting factor has the same probability of being the true value as the original point estimate. To the extent a confidence interval is utilized, regulatory restraints may determine how much deviation is appropriate and what support is required to justify these deviations.

Is it possible for two otherwise identical risks that would have been charged the same premium before applying price optimization to be charged different premiums after applying price optimization? If so, does Earnix believe this practice to be unfairly discriminatory given the classic definition of unfairness: being charged different prices to identical (from a cost-based perspective) insureds?

Can two consumers, identical in every way according to the class definition used by insurers to price risk, pay different prices due to price optimization, either by pricing itself or by underwriting, tiering, company placement or other means?
It is not possible for two otherwise identical risks that would have been charged the same premium before applying optimization techniques to be charged different premiums after applying optimization techniques. The Earnix software does not involve underwriting, tiering, company placement or anything else other than augmenting an insurer’s judgment when competitively setting rates.

Is Earnix aware of any insurer that has used price optimization to charge a premium that is higher or lower than the actuarially indicated premium? If yes, does Earnix find such premiums to be excessive or inadequate?

Insurers generally deviate to some extent from the actuarially indicated premiums for competitive purposes whether they use optimization techniques or not. Price optimization is used to augment the insurer’s judgment when deviating from their actuarially indicated premiums and it may suggest both positive and negative adjustments to those premiums. Final selected premiums are required to be consistent with both actuarial standards and regulatory requirements. Our understanding is that premiums meet the statutory standard of adequate, not excessive and not unfairly discriminatory if the filed rates reflect projected costs which are reasonably close to the actuary’s projected cost before any adjustments are made.

Does Earnix believe that any insurer that incorporates price optimization should explain and detail its use to insurance regulators? If yes, does Earnix advise its clients to disclose to regulators that its products have been used to optimize the rates being filed? And, if yes, what level of detail does Earnix believe insurers should provide to regulators about its price optimization product and how it is used?

Has Earnix ever advised insurers not to explain and detail their use of price optimization to insurance regulators? If so, why?

Earnix does not provide any advice to our customers on rate filings or any other regulatory matters. We have never advised insurers not to explain and detail their use of price optimization to insurance regulators.

Filed rates are required to meet actuarial and regulatory standards, whether or not optimization techniques are used to develop them and should be supported by information sufficient to meet regulatory requirements, including projected costs, the methodology for determining projected costs and an explanation for any deviation from these costs. As such, it is our opinion that the use of optimization techniques is not relevant to the regulator’s decision of whether rates meet the statutory rate standards of adequate, not excessive and not unfairly discriminatory.

Explain how the use of price optimization is described (what words or terms are used) and detailed in a rate filing.

Is Earnix aware of any insurer that has incorporated price optimization in determining the premiums that it charges, explained and detailed its use of price optimization in a rate filing submitted to regulators U.S. regulators? If so, can Earnix provide an example of the explanation and support provided by such an insurer? Is Earnix aware of any regulator approving the use of price optimization; if so, what was the form of price optimization that was filed with the regulator?

How does Earnix show the effect of price optimization on the traditional rate indications based on expected losses?

Earnix does not make rate filings and is not aware if and how the use of price optimization is described and detailed in a rate filing.
If insurers are using Earnix tools to modify filed/approved rates for individual risks, has Earnix allowed any insurers to file its algorithms/models with insurance regulators?

The Earnix software is used to develop the rates that are filed for approval. No insurer uses Earnix to modify filed/approved rates for individual risks.

Has Earnix ever been asked by any of its clients to explain or support its price optimization product to a U.S. insurance regulator? If so, how detailed was Earnix’s explanation/support and what was the outcome?

Earnix has never been asked by any of its clients to explain or support its price optimization product to a U.S. insurance regulator.

Does Earnix intend to file price optimization type models on behalf of its clients, or will Earnix provide regulatory support when their client insurers file their models?

Earnix’s software is not used to determine cost or risk characteristics that impact rate classification. The Earnix software is used to help inform an insurer’s judgment by producing suggested competitive adjustments to better meet an insurer’s goals. Insurers determine whether these adjustments meet actuarial standards and regulatory requirements. Accordingly, Earnix does not intend to file its software on behalf of its clients or provide regulatory support.

Does Earnix believe vendors of price optimization products should be regulated as advisory organizations since the tools directly alter prices consumers pay for auto insurance, or does Earnix believe its role is more similar to companies who develop credit history rating models?

Earnix does not believe that vendors of price optimization products should be regulated as advisory organizations. Earnix does not make rates, rating plans or determine costs for its customers. Earnix does not advise its customers on how to make rates, rating plans or how to determine costs. Nor does Earnix provide data to its customers or assist in any cooperative activity among them. Earnix provides a software platform that applies statistical analysis to an insurer’s data and other inputs. Moreover, price optimization can be carried out by expert analysts with general purpose software like SAS, R and even Excel. Price optimization does not necessarily require purpose built software. We feel it would be discriminatory to regulate software vendors that promote price optimization software, while other general purpose vendors’ software can be used by insurers for the same tasks. Insurers that utilize the Earnix software platform determine the rates that they charge consumers without any assistance, oversight or advice from Earnix.

Earnix’s role is also not similar to companies who develop credit history rating models. Credit scores are used to create risk characteristics used to define a rate class. There are certain standards a rate class must meet or the entire rate schedule may be unfairly discriminatory. As such, they need to be filed for the regulator to review. Earnix’s price optimization software is not used to determine costs or rate classifications. Earnix software is used to help inform an insurer’s judgment by applying statistical techniques that produce suggested competitive adjustments to better meet an insurer’s business goals.
Would the value of price optimization applications in insurance rating be enhanced or diminished if regulators required insurers to disclose that at the point of sale?

If insurance regulators made the public aware that price optimization models might affect their insurance prices along with the impacts that might have on their premiums, does Earnix believe their assumptions about consumer shopping behavior would change? If yes, in what ways?

These questions are difficult to assess and frankly, to understand. Would the value of any particular input to an insurer’s determination of its rating plan be enhanced or diminished if regulators required its disclosure at the point of sale? More particularly, would the value of an insurer’s use of statistical techniques or analytics be enhanced or diminished if regulators required its disclosure at the point of sale? Earnix cannot begin to assess whether such disclosures could have any meaningful impact on a consumer’s shopping decision.

In addition, Earnix does not make any assumptions concerning, and does not monitor data about, consumer shopping behavior. Insurers gauge consumer shopping behavior from their own data and predictive models. Accordingly, Earnix has no opinion whether disclosures concerning an insurer’s use of price optimization techniques or other competitive adjustments will have an impact on consumer shopping behavior.

Thank you again for the opportunity to respond to your questions. We are hopeful that our responses are helpful to you in understanding the role of statistical analysis in the insurer rate setting process.

Best regards,

Meryl Golden
General Manager, North America
203-246-5602
Earnix | Predict. Perform.
BULLETIN 14-23

Date: October 31, 2014

To: All P&C Insurance Companies, Rating Organizations, Joint Insurance Association, and the Maryland Automobile Insurance Fund

Re: Unfair Discrimination in Rating: Price Optimization

It has come to the attention of the Maryland Insurance Administration ("MIA") that some insurers are using “price optimization” to rate insurance policies in Maryland. Price optimization refers to the practice of varying rates based on factors other than the risk of loss, such as the likelihood that policyholders will renew their policies and the willingness of certain policyholders to pay higher premiums than other policyholders. The MIA has determined that the use of price optimization results in rates that are unfairly discriminatory in violation of §27-212(e)(1) of the Insurance Article. As a result, insurers may not use price optimization to rate policies in Maryland.

Definitions

For purposes of this bulletin, the following definitions apply:

(1) “Price optimization” means varying rates based on factors other than risk of loss, including, but not limited to:

(a) the likelihood that a policyholder will engage in activities that result in policy turnover; and

(b) the willingness of a policyholder to pay a higher premium compared to other policyholders.

“Engage in activities that result policy turnover” includes, but is not limited to:

(a) shopping with other carriers for a lower premium;
(b) canceling a policy before the expiration of the policy term; and

(c) failing to renew a policy at the renewal of the policy term.

Maryland Law Applied to Price Optimization

In General

Section 27-212(e)(1) of the Insurance Article provides that:

An insurer may not make or allow unfair discrimination between insureds or properties having like insuring or risk characteristics in:

(i) the premium or rates charged for insurance;

(ii) the dividends or other benefits payable on the insurance; and

(iii) any of the other terms or conditions of insurance.

For purposes of the Insurance Article, the Court of Appeals has defined unfair discrimination as “discrimination among insureds of the same class based on something other than actuarial risk.” Insurance Commissioner v. Engelman, 345 Md. 402, 413 (1997). By its nature, price optimization involves discriminating among policyholders of the same class based on factors other than actuarial risk. The purpose of price optimization is to move away from traditional cost-based rating to take advantage of price elasticity in the market by charging the most that the market will bear without losing business.

One of the ways that insurers use price optimization is to analyze patterns of behavior of policyholders to try to predict whether a policyholder is likely to switch to another insurer if the insurer increases premiums. This may involve the use of a “retention model.” If an insurer’s analysis indicates that a policyholder is likely to switch to another insurer, that policyholder will be charged a lower premium than a policyholder who is considered unlikely to switch to another insurer.

By way of example, one developer of price optimization models indicated that one of the characteristics it would consider is whether a policyholder has complained to the insurer.¹ If a policyholder has complained, this would indicate that the policyholder is unsatisfied and not likely to accept a premium increase. As a result, all other things being equal, this policyholder would be charged a lower premium than a policyholder who has not complained to the insurer. This means that policyholders would be charged higher premiums simply because they have not complained to the insurer, regardless of whether these policyholders pose any more risk of loss than policyholders who have complained.

One advocate of price optimization explained its use as follows:

¹ Presentation of Towers Watson to the NAIC Auto Insurance (C/D) Study Group on July 28, 2014.
Microeconomic theory teaches us that thoughtful selection of prices, or price discrimination, is a key to maximizing revenue and profit. Our research, in fact, reveals that if P/C insurers adopt advanced pricing strategies that consider customer elasticity differences, they can boost their revenue by roughly 3 percent and returns-on-equity by 1 percent, on average.

Price elasticity of demand (PED) essentially refers to the responsiveness – elasticity – of a customer in terms of the quantity of a product that he or she will buy when the price of that product changes.

Assume that through careful study of an insurer’s data, we can determine that females of a certain age exhibit less price elasticity than male drivers of the same age or females in adjacent age categories. Without being overly prescriptive, we could tweak the established rating relativity variables – within their accepted confidence levels – to arrive at a different rate for those drivers.²

As this explanation indicates, price optimization involves varying rates based on factors that are unrelated to risk of loss, such as price elasticity or the willingness of an insured to accept a premium increase. Consequently, the use of price optimization may result in two insureds with like risk characteristics being charged different premiums, which is a violation of §27-212(e)(1) of the Insurance Article.

**Corrective Action Plan**

The MIA requires every insurer that currently utilizes price optimization to rate insurance policies in Maryland to file a corrective action plan with the Maryland Insurance Administration no later than January 1, 2015. An insurer should include in the corrective action plan:

- the lines of business for which the insurer is using price optimization, a description of the manner in which the insurer is using price optimization, and the SERFF filing numbers of any rate and/or rule filings that contain price optimization;
- a description of the company’s proposed corrective action;
- a target date for making corrective rate and/or rule filings; and
- a target date for implementing the corrective rate and /or rule filings.

Corrective action plans may be mailed, emailed, or faxed to the following:

Geoffrey Cabin  
Director, P&C Rates and Forms  
200 St. Paul Place, Suite 2700  
Baltimore, MD 21202  
Email: geoffrey.cabin@maryland.gov  
Fax: 410-468-2307

Failure to submit a corrective action plan and to re-file rates/rules that are compliant with Maryland law may result in administrative action. Any questions or comments regarding this bulletin should be addressed to Geoffrey Cabin, Director of P & C Rates and Forms at Geoffrey.cabin@maryland.gov or at 410-468-2310.

Therese M. Goldsmith
Insurance Commissioner

By:

Sandra Castagna
Associate Commissioner
Property and Casualty
November 3, 2014

Mr. Joseph G. Murphy  
Commissioner, Massachusetts Division of Insurance  
Chair of the Auto Insurance (C/D) Study Group  
National Association of Insurance Commissioners

Transmitted via email to Joseph.G.Murphy@State.MA.US

Dear Commissioner Murphy,

Thank you for allowing Towers Watson the opportunity to present before the Auto Insurance (C/D) Study Group on July 28, 2014, concerning the use of mathematical optimization techniques in guiding the selection of insurance prices. This letter provides additional information in response to the questions the Study Group presented to Towers Watson in your letter to Serhat Guven dated September 5, 2014.

As many of the questions address a set of common themes, including some general misconceptions, we open this letter by explaining some fundamental facts. Also, for avoidance of doubt, our explanations and responses relate to the U.S. insurance marketplace and to Towers Watson’s insurance consulting services unless stated otherwise.

First, Towers Watson has not maintained data or provided data to our clients for price optimization exercises. All data used in our optimization projects has been provided by the carrier. Also, we have not requested nor analyzed data from a U.S. client that identified a customer’s race, ethnicity or personal income.

Second, Towers Watson’s optimization software does not prescribe a pre-parameterized algorithm. Our software provides: a) an environment for a carrier to integrate its own models (e.g., loss cost models, expense assumptions, policyholder demand models) on customer data and b) mathematical algorithms that search the universe of rating structure parameters (i.e., relativities) to identify the set(s) that most closely meets the carrier’s corporate objectives, subject to its constraints. Each carrier specifies its own objectives and constraints, which will vary from carrier to carrier. Hence, each optimization exercise is unique.

Price optimization techniques do not replace the process of determining indicated cost-based premiums. In fact, expected costs are a necessary and key input to applying price optimization techniques. The output of an optimization exercise is meant to inform the carrier’s pricing decisions – much like a simple factor-by-factor competitive analysis has been used for decades to inform such decisions.

For lines of business that require a filed rate order calculation, it is not possible for two identical risks to be charged different premiums – with or without the use of price optimization in selecting prices. Additionally, price optimization does nothing to change the requirement that filed rates are in fact what the customer is charged (as required by state regulation).

Finally, our software has appeal in the insurance industry because it is efficiently programmed and well-tested and offers the user many benefits – e.g., speed, flexibility, highly visual output. However, many
generic software platforms such as Excel, SAS and R can be programmed by qualified resources to perform such calculations.

The next section addresses the specific questions asked by the NAIC. Questions of a similar nature have been clustered together and addressed in a single response.
Price Optimization Model and Usage

How does TW define price optimization? What items are modeled (e.g., retention, demand elasticity, etc.) and what variables do you incorporate from your model output?

TW defines price optimization as a systematic process for suggesting adjustments to theoretical cost-based prices that better achieve business objectives, subject to known constraints. The key objectives are embodied in portfolio-level key performance indicators such as volume, premium revenue, profit, lifetime value, etc. The adjustments to cost-based indications typically reflect price competitiveness, price responsiveness and long-term customer lifetime value considerations. Constraints include both internal constraints (e.g., brand considerations, ability of a policy administration system to program a certain rating plan) and external constraints (e.g., compliance with state regulations).

The foundation of a price optimization exercise is an integrated price assessment environment. Such an environment integrates various models or data on one or more customer datasets, which may be in-force customers, quotes or notional policies. Commonly these models estimate loss amounts, underwriting expenses and customer demand behavior. There may be several models of each type. For example, frequency and severity models by type of claim are often used to estimate loss amounts. Separate models are used to model different types of customer behavior – e.g., new business conversion, renewal, mid-term cancellation and cross-sell.

Towers Watson’s optimization software provides an environment for integrated price assessment but does not prescribe any models, data, objectives or constraints. These are provided by the insurance carrier.

The integrated price assessment environment allows for financial projections to be undertaken policy by policy. For any given rate scenario included in the price assessment environment, a premium amount is calculated for the individual customer (commonly referred to as “extension of exposures” in the actuarial community). Integration of the aforementioned models enables calculation of metrics such as expected volume, profit and lifetime value. The metrics are produced for each individual customer and then cumulated to the portfolio level, which enables an assessment of whether the chosen rate scenario is helping the carrier achieve its objectives. Using this type of approach, carriers test a small number of rate scenarios during their rate selection process.

Mathematical optimization algorithms can be used to generate a much larger number of rate scenarios to run through the price assessment environment, and to identify which scenarios better achieve business objectives subject to known constraints.
How many U.S. auto insurance companies has Towers Watson provided services for? What percentage of the market does this represent?

Does Towers Watson know approximately how many auto insurance companies use price optimization for business written in the U.S.?

In addition to price optimization, does Towers Watson know how many auto insurance companies (and what percentage of the market) uses elasticity of demand in pricing and how many/what percentage uses competition in pricing?

Does Towers Watson know approximately what percentage of the auto insurance market uses price optimization in the U.S? Is Towers Watson able to split this percentage between personal and commercial auto?

Towers Watson does not know what percentage of the U.S. auto insurance market uses elasticity of demand, competitive assessment or price optimization in their pricing. However, Towers Watson conducts an annual survey to evaluate industry use of predictive modeling techniques across all personal and commercial products. In 2013, of the 59 U.S respondents, 5% indicated that they use price optimization today for some of their products and an additional 12% said they were likely to expand their price assessment capabilities to price optimization in the future. This was not a scientific survey and responses were not validated.

Do some insurers use Towers Watson tools before rates are filed while others use Towers Watson tools after the rates have been filed, i.e., to modify an individual insured's premium using the insurer’s filed/approved rates? If so, please provide the numbers for each category.

What are the various methods insurers use to incorporate price optimization in determining the premiums that they charge? In what way do they vary between personal and commercial lines, and among the various types of personal and commercial lines of business?

What are the various methods insurers use to incorporate price optimization into their rate schedules, such as underwriting, marketing, claims, reserving?

In what ways, other than to determine premiums to be charged, do insurers use price optimization? Explain how price optimization is used in each. In what way do they vary between personal and commercial lines, and among the various types of personal and commercial lines of business?

For lines of business that require a filed rate order calculation (e.g., voluntary private passenger auto), price optimization provides one of many inputs that carriers synthesize to select rates to file. In our experience, insurers usually spend significant time and effort to ensure that the final rates meet their internal and external constraints, and this is true with or without mathematical optimization. Once selected and filed, these are the rates to be charged customers. Price optimization is not used to modify an individual insured’s premium from the otherwise applicable filed rate.

For lines of business that allow deviation from filed rates (e.g., commercial property), price optimization could be used to guide the underwriter’s judgment in how to deviate from manual rates.

The output of a price optimization exercise provides a data point – much like current premium, cost-based premium and competitor premium. Towers Watson is not fully aware of the extent to which our clients utilize this data point in applications beyond pricing. For example, the results could be used to develop target marketing strategies.
Does Towers Watson's algorithm include an evaluation of consumers' responsiveness to premium levels or premium changes? If so, how does Towers Watson determine consumer (or class of consumers) responsiveness to premium levels or premium changes? If market premiums are considered in evaluating consumer responsiveness, how is market premium information obtained and verified that it is current and accuracy?

Does Towers Watson maintain data on individual customer's shopping habits?

How is the ‘degree of consumer responsiveness’ used in Towers Watson’s pricing algorithm? Would a consumer (or class of consumers) that is found to be less responsive to price changes be identified for upward adjustments in premiums?

What are the categories you use to identify who shops more or less than average?

Towers Watson has not distributed or licensed data on U.S. customers’ loss experience or shopping habits. All data has been provided by the insurance carrier.

Towers Watson’s optimization software provides an environment for integrated price assessment but does not prescribe any models, data, objectives or constraints. These are provided by the insurance carrier. The input models include policyholder demand models, which are often separate models for some or all of new business conversion, renewal, mid-term cancellation and cross-sell. These demand models do not describe which customers shop more or less but rather how likely a customer is to renew a policy or to accept an insurer’s quote.

Policyholder demand models are generally fit to recent, customer-level, historical data that contains information about the customer as well as what purchase decision the customer made (e.g., did the customer renew – yes/no, did she or he accept this quote – yes/no). Predictors in such a model include premium-related information (e.g., premium charged, change in premium, competitor premium or some comparison to competitor premium) as well as non-premium information (e.g., distribution channel and many risk characteristics commonly used in ratemaking – e.g., multi-product indicator, insured’s age).

In our experience, insurers collect competitor premium information in one of three ways:

Licensing comparative rating software from a third party vendor

Integrating data from broker quotation systems

Programming competitor rate order calculations (obtained from public filings or rules/rates manuals) and then applying the calculation to the policies contained in the customer data

Many factors contribute to suggested upward or downward price adjustments in an optimization exercise. These include price competitiveness, price responsiveness, volume considerations, long-term customer value considerations, internal constraints (e.g., brand considerations or operating constraints) and external constraints (e.g., compliance with state regulations).
Has Towers Watson ever tested its model against variables that may be correlated with race, ethnicity, credit history or income? If yes, what were the results? Is race, ethnicity, or income considered in Towers Watson’s algorithm? Does your research show the degree of shopping for categories of consumers based on these categories?

Towers Watson’s software does not have a prescribed algorithm for price optimization. The carrier directs the optimization exercise by specifying inputs (e.g., models predicting expected cost, expense, policyholder demand), targets (e.g., portfolio-level profit and volume) and constraints.

We have not maintained data or provided data to our clients for price optimization exercises. All data used in our optimization projects is provided by the client.

We have not requested nor analyzed data from a U.S. client that identified a customer’s race, ethnicity or personal income; consequently, we have not tested any price optimization output on those variables.

Please identify all risk attributes that are incorporated into price optimization models that are not currently recognized in traditional cost based rating plans.

Please identify the source of the risk attributes information used in price optimization models that are not customarily used in traditional cost based rating plans.

The insurer specifies the individual risk attributes to be considered in a price optimization exercise. These are generally considered via the predictors retained in the insurer’s underlying models for expected loss costs, underwriting expenses and policyholder demand. Loss cost models typically include traditional rating variables (e.g., deductible, model year, prior claims experience) as well as underwriting criteria (e.g., insurance-based credit score, payment plan, prior lapse). Some of these traditional variables are obtained from third party data providers (e.g., ISO vehicle symbols, TransUnion insurance-based credit scores).

Policyholder demand models generally incorporate these same traditional rating variables but may also include premium-related information (e.g., premium charged, change in premium, competitor premium or some comparison to competitor premium). As discussed previously, competitor premium information may be obtained from third party vendors or from the carrier’s own efforts to collect competitor rate filings or rules/rates manuals.

Please explain how consumer propensity to shop for insurance is consistently related with their driving behavior.

The demand models generally used for price optimization do not describe which customers shop more or less but rather the likelihood of a customer accepting a renewal offer or a quote at a given price. These models are calibrated on recent, historical customer response data.

Similarly, loss models predict insurance losses at the individual risk level, based on historical policy and claims experience.

In the U.S., many of the same variables are present in both types of models. The relationship between the likelihood of a customer accepting an insurance offer and the customer’s expected insurance losses varies by variable.
How stable are the variables in a price optimization model, and how would insurers be able to keep their models current?

The stability of variables in a price optimization exercise is a function of the stability of variables in each of the underlying input models. Sound practice in building models to predict costs or policyholder demand is to examine the stability of each variable over time and/or random subsets of the data.

Towers Watson believes that most insurers validate their cost models at least annually – and in doing so, investigate any discrepancies in how the model fits the new data. Demand models are generally validated or re-fit more frequently in recognition of the dynamic nature of the competitive environment.

How, if at all, does Towers Watson’s price optimization algorithm vary by state?

Towers Watson’s price optimization software does not contain a prescribed algorithm nor does it specify the variables to be used in any of the underlying input models. The insurer controls the inputs, targets and constraints in a price optimization exercise and would specify how those elements need to vary from state to state.

How would Towers Watson describe the quality of competition in countries where price optimization is prevalent?

The most notable example of a market for which price optimization is prevalent is the U.K. personal lines market. This market is widely viewed as being highly competitive. The degree of competition is driven by many factors, including the prevalence of price comparison websites.
Regarding confidence intervals:

Does Towers Watson believe that there is a range of reasonableness, or confidence interval, around the rate calculated in the traditional actuarial (cost-based) way? If so, are insurers free to charge whatever they want in that range? Is the range submitted to the regulator in the filing?

If the range is used to alter the price through price optimization, should the insurer be required to tell the regulator what it did and submit the range and how it was calculated as part of the filing?

Does the range vary from class to class? Does a class with a lot of credibility to the data have a narrow range and a class with low credibility have a wider range?

If an insurer increases the number of classes, dropping the credibility in each class, does that give the insurer the right to raise rates more through price optimization than an insurer with a more stable rate system? If a class has zero credibility, can the insurer pick any price it wants?

First, we would like to clarify that our response refers to the confidence interval of parameter estimates (i.e., the indicated relativities for each variable, not the indicated loss cost for a given risk).

Confidence intervals of parameter estimates, among other statistical diagnostics, are commonly used to guide the building of a predictive model. For example, confidence intervals can aid in identifying for elimination those variables that do not have a systematic effect on the metric being modeled (e.g., loss costs) or in simplifying variables that contain levels that are not statistically different from one another. The size of the parameter estimate’s confidence interval depends on such influences as the strength of the predictive power, the stability of the metric being modeled, the homogeneity of risks and the volume of the underlying data.

Each carrier incorporates different input models, targets and constraints in its process to select final premiums to charge. If a carrier desires that final rates be reasonably close to cost-based premium estimates, it may use confidence intervals of the cost-based premium estimate as a guide or restraint in selecting final rates (irrespective of using or not using price optimization to inform the selection). Using confidence intervals is the sole decision of the insurance carrier and is not an implicit or fixed assumption within a price optimization algorithm.
Regulatory Aspects

Is it possible for two otherwise identical risks that would have been charged the same premium before applying price optimization to be charged different premiums after applying price optimization? If so, does Towers Watson believe this practice to be unfairly discriminatory given the classic definition of unfairness: being charged different prices to identical (from a cost-based perspective) insureds?

Can two consumers, identical in every way according to the class definition used by insurers to price risk, pay different prices due to price optimization, either by pricing itself or by underwriting, tiering, company placement or other means?

For U.S. lines of business that require a filed rate calculation, it is not possible for two identical risks to be charged different premiums. This is true whether or not price optimization techniques were used to inform selection of filed rates. Additionally, price optimization does nothing to change the requirement that filed rates are in fact what the customer is charged (as required by state regulation).
Is Towers Watson aware of any insurer that has used price optimization to charge a premium that is higher or lower than the actuarially indicated premium? If yes, does Towers Watson find such premiums to be excessive or inadequate?

Does Towers Watson believe that any insurer that incorporates price optimization should explain and detail its use to insurance regulators? If yes, does Towers Watson advise its clients to disclose to regulators that its products have been used to optimize the rates being filed? And, if yes, what level of detail does Towers Watson believe insurers should provide to regulators about its price optimization product and how it is used?

Explain how the use of price optimization is described (what words or terms are used) and detailed in a rate filing.

If insurers are using Towers Watson tools to modify filed/approved rates for individual risks, has Towers Watson allowed any insurers to file its algorithms/models with insurance regulators?

Is Towers Watson aware of any insurer that has incorporated price optimization in determining the premiums that it charges, explained and detailed its use of price optimization in a rate filing submitted to regulators U.S. regulators? If so, can Towers Watson provide an example of the explanation and support provided by such an insurer? Is Towers Watson aware of any regulator approving the use of price optimization; if so, what was the form of price optimization that was filed with the regulator?

Has Towers Watson ever been asked by any of its clients to explain or support its price optimization product to a U.S. insurance regulator? If so, how detailed was Towers Watson’s explanation/support and what was the outcome?

Has Towers Watson ever advised insurers not to explain and detail their use of price optimization to insurance regulators? If so, why?

Insurers commonly select rates that deviate from a cost basis for many sound business reasons – e.g., to improve competitive position, spur growth in target markets, improve customer lifetime value or avoid large premium swings on in-force risks. The actual selection of how much to deviate and for what types of risks is often a best guess – or the outcome of testing numerous scenarios to see which best achieves overall objectives, subject to constraints. The use of mathematical algorithms incorporates the business goals objectively rather than subjectively and can expedite this search and provide useful information to the carrier.

Towers Watson’s software does not have a prescribed algorithm for price optimization. The carrier directs the optimization exercise by specifying inputs (e.g., models predicting expected cost, expense, policyholder demand), targets (e.g., portfolio-level profit and volume) and constraints.

Just as the carrier defines and guides the optimization exercise, the carrier also selects the final rates to file. The carrier owns the responsibility to demonstrate that its selected rates are in compliance with laws and regulation.

Towers Watson has not been asked by a client to provide an explanation of price optimization techniques for use in a rate filing.
How does Towers Watson show the effect of price optimization on the traditional rate indications based on expected losses?

Price optimization is used to provide an additional input to inform a carrier’s selection of final rates. As with any approach to select final rates, a comparison of cost-based premiums to selected premiums can be shown.

Has Towers Watson changed its price optimization model due to the rating laws for a particular state? If so, what changes were made?

Towers Watson does not have a prescribed model. Each carrier customizes their price optimization exercise to consider its inputs, targets and constraints – including universal or state-specific constraints.

Does Towers Watson believe that small rate increases (above risk-based levels) meet regulatory standards but large ones, using the same methods, would not? Does this vary based on the credibility of the class being price optimized?

Does Towers Watson intend to file price optimization type models on behalf of its clients, or will Towers Watson provide regulatory support when their client insurers file their models?

Does Towers Watson believe vendors of price optimization products should be regulated as advisory organizations since the tools directly alter prices consumers pay for auto insurance, or does Towers Watson believe its role is more similar to companies who develop credit history rating models?

Each optimization exercise is bespoke to the carrier – it relies on the carrier’s data, assumptions, input models, targets and constraints. As such, there is no industry “model” to file with regulatory bodies.

Price optimization exercises are not similar to insurance-based credit scoring models, which are designed to develop risk classifications to be used in rating. Price optimization is used to guide selection of final rates in order to best achieve corporate goals, subject to constraints.

Towers Watson’s price optimization software is meant to facilitate the building of a price assessment environment – including the use of mathematical algorithms. Our software has appeal in the insurance industry because it is efficiently programmed and well-tested and offers the user many benefits – e.g., speed, flexibility, highly visual output. However, many generic software platforms such as Excel, SAS and R can be programmed to perform such calculations. As such, it does not seem equitable to regulate a subset of all available software packages.

Would the value of price optimization applications in insurance rating be enhanced or diminished if regulators required insurers to disclose that at the point of sale?

If insurance regulators made the public aware that price optimization models might affect their insurance prices along with the impacts that might have on their premiums, does Towers Watson believe their assumptions about consumer shopping behavior would change? If yes, in what ways?

The demand models generally used for price optimization do not describe customer shopping behavior but rather the likelihood of a customer accepting a renewal offer or a quote at a given price. Customers consider many things when choosing whether or not to accept an insurer’s offer. This includes the need for insurance, the availability of coverage, the price offered by the insurer, the price offered by competing insurers and the perceived quality of each carrier’s products and service. To the extent these considerations and their relative importance in decision-making are dynamic, the likelihood of accepting a
renewal offer or quote at a given price can change. It is not feasible for us to estimate how mandated disclosure of pricing techniques would change consumer purchasing decisions.

* * *

Thank you again for the opportunity to respond to the Study Group’s questions. We hope our responses help explain how optimization techniques help inform individual carrier’s pricing decisions in a dynamic, competitive marketplace.

Regards,

Claudine Modlin
Director
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Dec. 4, 2013 Minutes

Bob Hunter (Consumer Federation of America—CFA) discussed the use of price optimization by auto insurers. He said price optimization bases premiums on the maximum amount consumers are willing to pay rather than on loss costs or claims. He said there is evidence that the use of the practice is widespread among insurers and is a rejection of actuarial standards at the expense of policyholders. Mr. Hunter said auto insurance is different from other products, such as airline tickets, and should not be based on willingness to pay, especially when states require the purchase of auto insurance.

Mr. Hunter said price optimization bases the price quoted to consumers on elasticity of demand. He said prices are optimized to squeeze as much out of consumers as possible. He said insurer actuaries set the price using traditional ratemaking methods but then the price is altered by marketing experts. He said this violates unfair discrimination requirements because policyholders with identical risk would pay different prices for the policy. He said an Earnix survey found that 45% of large insurers and 12% of small insurers currently optimize their prices for auto insurance. Mr. Hunter said price optimization is not used in filings, but in underwriting or tiers. He said he believes the practice to be illegal and violates Casualty Actuarial Society standards of practice for setting rates. He said regulators have the duty to stop the practice. He recommended that the Study Group contact Earnix to determine which insurers use price optimization and explain its use.

Mr. Kabler asked if there are any tell-tale signs that insurers are using price optimization, since it is not in the rate filings. Mr. Hunter said prices are adjusted at the time of the quote. Mr. Jain asked whether the practice is widespread. Mr. Hunter said it is widely used in Europe by auto insurers and, according to Earnix, is being used by many U.S. insurers. Mr. Jain asked if the practice varied based on the type of rating law a state had. Mr. Hunter said he did not believe the rating law mattered, but he said most state regulators do not know if the practice is occurring in their state. He said his findings show that rates are often higher than what is showing in rate filings. Ms. Pallozzi asked if it would be acceptable for a company to deviate downward from a filed rate due to market dislocations or adverse impact on the current book. Mr. Hunter said the rate would not meet actuarial standards, but giving customers a discount is acceptable. He said raising the price is a problem when consumers are required to purchase the product. Ms. Byckovski asked if price optimization is different from hundreds of rating tiers. Mr. Hunter said the practice occurs after tier placement.

Commissioner Goldsmith said the Study Group would reach out to Earnix to find out more about the business and its operations and products.

March 17, 2014 Minutes

Commissioner Murphy explained that the topic of price optimization came before the Study Group last year. At the time, consumer representatives had concerns that by basing the price of
an insurance policy on the elasticity of consumer demand, unfair discrimination requirements could be violated and identical risks could pay different prices for the same policy. In order to receive more information about the use of price optimization, the Study Group invited Earnix to present on the issue.

Meryl Golden (Earnix, North America) said Earnix is a software company based in Israel with large financial institutions as customers. She said Earnix offers loss costs modeling as well as an end-to-end pricing platform to insurance companies. Ms. Golden said price optimization is a systematic and statistical technique to help an insurer determine a rate plan that better fits the competitive environment, within actuarial and regulatory standards. She said rate filings developed using price optimization are subject to the same actuarial and regulatory standards as any filings. Price optimization is just a technique used to determine what the rates should be. Price optimization helps inform an insurer’s judgment when setting rates by producing suggested competitive adjustments (output) to the indicated costs (input). Price optimization utilizes a variety of applied mathematics techniques—including linear programming, nonlinear programming and integer programming—to analyze an insurer’s data and other considerations.

Ms. Golden said price optimization is an application of prescriptive analytics as opposed to predictive analytics. She said price optimization helps solve the question: “What are the best alternatives to achieve my business goals?” She said an insurance company might want to increase retention but not have the loss ratio move by more than a point. Price optimization enables an exhaustive search across thousands of pricing alternatives in multiple scenarios that assist insurers in their comparative rate analysis. Ms. Golden said price optimization improves the efficiency of the rate setting process and enables companies to more accurately predict the outcome of their rate decisions. Price optimization performs a search, charging all combinations of pricing alternatives. She said actuaries usually conduct a “what if” analysis, but price optimization makes this analysis of rate-setting more efficient and accurate.

Ms. Golden said price optimization is applied very differently in regulated and unregulated markets. In unregulated markets, personal lines insurance policies are often sold over the Internet via aggregators. The price may change constantly and consumers can negotiate price. In the regulated U.S. markets, price optimization must comply with the Casualty Actuarial Society’s (CAS) Statement of Ratemaking Principles and comply with rate regulation in all states. Unregulated foreign markets have no rate filings and individual, rather than segment level, pricing. In the U.S., prices may change once or twice a year while they change daily or more frequently in foreign markets.

Ms. Golden said price optimization fits into the rate-setting process. She said the rate-setting process does not change with the use of price optimization; instead, analytics supplement judgment in determining competitive adjustments to indicated costs. The rate making process starts with indicated costs whether or not price optimization is being used. Without the use of price optimization, analysts use judgment based on business goals, market position, competitor analysis, agent input, or customer response. With price optimization, analysts use price optimization to quantify these competitive adjustments. These analytics augment the actuary’s judgment in deciding what rate change to take. Price optimization produces suggested competitive adjustments to the indicated cost based factors. Ms. Golden showed an example of
what optimization actually does. The example assumed three rating examples and the cost based factors. The optimization is run on these factors and results in suggested adjustments, either up or down. The actuary does not take the adjustments and file them. The actuary must determine if the adjustments make sense in light of their business objectives and make sure they can support the changes given actuarial and regulatory standards.

Ms. Golden addressed several statements Earnix considers misconceptions about price optimization. She said with price optimization the same actuarial and regulatory standards apply to filed rates whether a company uses price optimization or does not. She said price optimization is not about profit maximization in the U.S. insurance market although it could be with other products or in other markets. She said the profit provision is regulated by states. She said all companies consider consumer response in their pricing today. With price optimization, this is done in a more scientific way, with statistical models rather than just using judgment. She said price optimization does not produce rates that are unfairly discriminatory. She said loss costs are the foundation of rate setting. With price optimization, factors are typically constrained to stay within the confidence interval of cost estimates. All adjustments are to existing rating factors. She said price optimization is used to determine the rates that are filed and then used in the marketplace.

Mike Miller (EPIC Consulting) said actuaries are often involved in the pricing decision for the insurer. The role of actuaries in ratemaking is to determine the expected losses, expected expenses, and reasonable provisions for profit and for contingencies. Departures from the indicated costs may be made for competitive reasons but that is not an actuarial function. Management may make adjustments within the actuarially indicated rates to reflect a variety of business considerations, including marketing, underwriting, and competitive considerations. Mr. Miller said price optimization models support the business judgment; they provide no input regarding expected costs and are not actuarial in nature in terms of projected losses and expenses. He said the departure from cost is not actuarial; it is the decision of a pricing manager. He said a manager might file a rate that diverges from cost based rates but the rates still need to be justified by indicated costs—i.e., losses and expenses.

Mr. Miller said rate standards are common to nearly all states. He said rate regulatory laws in the individual states generally permit the rate filer to consider management’s business judgment and competition in considering the determination of the rates to be filed and charged to insureds. He said it is the responsibility of the rate filer to ensure that filed rates meet the statutory rate standards of adequate, not excessive, and not unfairly discriminatory. He said an actuary is able to opine that the filed rates meet the statutory rate standards if, and only if, the filed rates reflect projected costs which are reasonably close to the actuary’s projected costs. He said the utilization of price optimization in the determination of the rates to be filed is an exercise of management judgment reflecting a variety of business considerations.

Mr. Miller said he hopes regulators will not look at price optimization output as justification for filed rates but see how the filed rates are supported by projected losses and expenses. He said he read criticisms of price optimization from J. Robert Hunter (Consumer Federation of America) and he agreed with those concerns. But protection for the misuse of price optimization models to produce rates that might be unfairly discriminatory is already in the rate standards themselves.
He said filed rates continue to need to be justified by the expected losses and expenses just as they always have been.

Mr. Miller said not all statistical models are related to rate making. Only those that produce a cost component to be included in the rate or a risk characteristic that impacts any rate class are critical for the actuary and regulator to review. He said catastrophe models are filed because the projected losses produced by the models make up the catastrophe loss provision built into the actuarially indicated rate. In order for the actuary and the regulator to judge the reasonableness of the loss provision in the rate, they need to be familiar with how the model works and the input data. He said insurance score models are filed because they create risk characteristics used to define a rate class. There are certain standards any rate class must meet, or the entire rate schedule may be unfairly discriminatory. The actuary and the regulator need to be familiar with how the insurance score model works and the input data in order to determine if the insurance score is properly defining a rate class. Mr. Miller said the output of a price optimization model is different from other models because price optimization is not risk based, has no impact on the risk classification plan and no impact on the actuarially indicated rates. He said price optimization models produce suggested competitive adjustments to the indicated rate. The departure from the indicated rate is always allowed through judgment.

Ms. Golden said price optimization helps inform an insurer’s judgment when setting rates by providing suggested competitive adjustments to the indicated costs using advanced technical analysis. She said the same actuarial and regulatory standards apply to rate filings whether a company utilizes price optimization in their rate setting process or not. She concluded that the adoption of advanced analytical techniques can improve pricing sophistication which benefits insurers and consumers.

Ms. Golden said price optimization helps inform an insurer’s judgment when setting rates by providing suggested competitive adjustments to the indicated costs using advanced technical analysis. She said the same actuarial and regulatory standards apply to rate filings whether a company utilizes price optimization in their rate setting process or not. She concluded that the adoption of advanced analytical techniques can improve pricing sophistication which benefits insurers and consumers.

Ms. Pallozzi asked whether it is fair to say that insurers use price optimization as an analytical tool to support their judgment. Ms. Golden said it is correct that price optimization makes changes to indicated costs. Ms. Pallozzi also asked whether price optimization will result in a lower filed rate than what is indicated. Ms. Golden said the rate could be higher or lower. Ms. Pallozzi said regulators are hesitant to approve much above the indicated rate.

Mr. Laucher asked whether actuarial analysis creates an indicated rate threshold and then the model takes over from there and sets the proposed rate. Ms. Golden said that is correct. Mr. Laucher asked what components are considered to make a decision between the indicated and proposed rate. Ms. Golden said the model considers how prospects have responded to rates in the past, competitors’ prices, multi-car policies, age and other rating characteristics. Mr. Laucher asked how the model makes additional determinations to go higher or lower from the indicated rate based on one rating factor. Ms. Golden said price optimization may consider the probability of a customer renewing based on the rate change considered by the insurer. She said for a particular age group, the model might suggest that customers wouldn’t renew; it is then up to the insurance company to decide whether or not to change the rate.

Mr. Laucher asked whether price optimization looks at the overall impact on the entire policy and if it consider rating factor impacts with other rating factors. Ms. Golden said the system is trying to solve for an overall objective that a company sets. She gave an example of a company
looking at how to improve retention without the loss ratio going up more than a point. She said it depends on the individual goals of the company. Mr. Laucher asked whether price optimization is considered a managerial tool rather than an actuarial one. Mr. Miller said price optimization is not an actuarial tool because it does not factor expected losses or expenses. He said price optimization is clearly in the area of management judgment as to how to modify the actuarially indicated rate schedule.

Mr. Jain asked whether the models are available for regulators for their review. Ms. Golden said Earnix will come and show the software to any regulator. Mr. Miller said he understands why regulators are curious about how the models work but he has concern that it is not well-served if the output of the models become justification for rates. He said regulators should look at filed rates and make sure they are justified on existing rate standards. Ms. Golden said companies file indicated costs and selected factors whether or not price optimization is used.

Mr. Jain asked what the objective function for the model is. Ms. Golden said the company sets the objective, whether it is an increase in premium, in-force policies, etc. Mr. Jain asked what happens if there are infeasible solutions. Ms. Golden said if there is no solution the tool tells the insurer that. Mr. Jain asked whether actuaries were involved in the development of the tool. Ms. Golden said most of the work is done by insurance companies with actuaries and predictive modelers.

Mr. Laucher asked what would happen if the data showed a 19-year-old female were less likely to renew a policy if the price increased compared to a 35-year-old female. Ms. Golden said if the company objective were to increase retention and the 19-year-old were less likely to renew, then the system would recommend to not take rates up as much for the 19-year-old.

Mr. Hunter said the Earnix presentation is different from materials he had seen previously so he asked to submit questions in writing. Commissioner Murphy said that would be acceptable. Mr. Hunter pointed out there was nothing in the presentation about disclosing information to regulators. He said rate filings do not say that they are using price optimization so regulators are unable to know when it is being used. He asked whether rate filings have a before and after picture so that regulators could know the adjustment. Ms. Golden said price optimization is used to suggest competitive adjustments and then the companies make decisions on whether to adjust. She said insurers do not inform regulators about deviations from the indicated costs when methods other than price optimization are used. Mr. Miller said the filings would look as they always have, with indicated rate factors, indicated base rates, selected rate factors and selected base rates. He said the regulator should focus on rate factors and base rates where there is a divergence between what is indicated based on the expected losses and expenses. He said this difference could come from an operations manager or a price optimization tool. He said where the divergence comes from is not significant, but the degree of divergence is important.

Mr. Hunter said price optimization can result in big rate changes by altering just a few factors as the presentation showed. He asked how the regulator would know the degree of change. Mr. Miller said the regulator should look at the divergence between the indicated and proposed rates.
Mr. Hunter said the regulator does not have the second table that shows the degree of change made to each factor.

Birny Birnbaum (Center for Economic Justice—CEJ) said it is not true that the regulator can see this divergence just as they always have. He said regulators could see the maximum and minimum impacts of credit scoring. He said companies get an indicated rate and then use a model, such as with credit scoring, to make competitive adjustments to those rates. He said it is not accurate that price optimization is outside of the rating process even though it changes the ultimate rates. He said price optimization is unfairly discriminatory and does not meet actuarial standards.

Dave Snyder (Property Casualty Insurers Association of America—PCI) asked how the adoption of advanced analytical techniques and improved pricing sophistication can benefit insurers and consumers as mentioned in the presentation. Ms. Golden said price optimization can help companies improve their competitiveness and companies may be willing to accept additional risks. Mr. Miller said a small change in insurance retention rates can have a significant impact on insurers’ costs. Mr. Birnbaum said this argument about more refined rating introducing more competition to the marketplace has been brought up before. He said it may have been true when insurers were using a single rate but this is no longer true. He said the price optimization tool preys on consumers that are most vulnerable in the marketplace. He said price optimization seeks to maximize revenue subject to no greater lapse rates or combined ratios and this is clearly unfairly discriminatory.

Commissioner Murphy said comments on the issue should be submitted by the end of the week and the comments may be discussed at the Study Group meeting at the Spring National Meeting if there is time.

**July 28, 2014 Minutes**

Commissioner Murphy said the Study Group earlier heard from Earnix on the issue of price optimization and the Study Group is waiting to hear back from Earnix on questions from the Study Group. He said Towers Watson has been asked to give a similar presentation on how it uses price optimization in pricing auto insurance. Serhat Guven (Towers Watson) said the risk and financial services segment of Towers Watson is tasked with understanding, mitigating and pricing risk. He pointed out that the Casualty Actuarial Society has working groups looking into issues concerning price optimization.

Mr. Guven defined price optimization as “selecting a price that deviates from cost-based indications.” Mr. Guven said price optimization is not new. He said insurers have always set rates in line with business objectives. He said actuarial standards of practice acknowledge that companies charge a final price in line with other business objectives. He said selecting a price that deviates from cost-based indications is a common practice.

Mr. Guven said that, historically, insurers used judgment to make deviations from the indicated rate, trying to mitigate the impact on consumers while also being in line with the marketplace. He said the modern approach of price optimization removes judgmental bias from the process.
He said the price optimization solution puts rigor behind actuarial judgment. He said that, with each indication, there is a parameter estimate and quantitative statistics around the quality of that parameter estimate (also known as a confidence interval) showing how much the actuary can believe that indication. He said it is important to look at the point estimate and also the range of confidence around that estimate.

Mr. Guven said price optimization is a process for adjusting prices away from a cost-based benchmark to better achieve business objectives. He said these objectives are embodied in portfolio key performance indicators such as profit, volume, revenue, lifetime value and other indicators. He said adjustments to the cost-based indicators reflect profitability, price responsiveness, price competiveness and long-term customer value considerations. Price optimization uses customer knowledge to improve portfolio performance with the appropriate controls. Elements included under customer knowledge include risk costs, expenses, competitive positioning, buying behavior, retention behavior, existing product holdings, likelihood to purchase additional products and marketing activities. Improvements to portfolio performance include volume and/or profit uplift, sustained long-term improvement and strategy. The appropriate controls include internal controls, branding concerns and regulatory objectives. He stressed that objectives must be defined. If a company’s goal is to minimize subsidization, then there would be no adjustment to the indication.

Mr. Guven said cost models include expense, competitor and demand models. He said companies use customer level knowledge to select a rate that improves performance. He said controls include internal, branding and regulatory controls. Mr. Guven said without price optimization an insurer is only using loss costs and regulatory objectives, but is still selecting a price that deviates from the loss cost model.

Mr. Guven said insurers use cost models and expense models to define profit; demand models and competitor prices to define volume; and business constraints and regulatory objectives to define a search space. Traditionally, an actuary looks at cost models and expense models and makes a selection. This generates a scenario. Price optimization prospectively evaluates the impact of scenarios. Actuarially, an insurer can select from a cost model and generate scenarios to assess the scenario. A scenario is selected and the company asks the regulator for approval. Price optimization generates millions of scenarios in a search space to prospectively assess rating algorithms that reflect all known information most in line with business and regulatory objectives. He said insurers are looking for the right rate for the risk depending on overall and regulatory objectives.

Mr. Guven said customer knowledge is used to simulate a constrained search space. The insurer can then calculate an expected profit. If a price is increased too much, renewal may fall and expected profits fall. He said a wide array of constraints is introduced into the optimization algorithm, reflecting internal and external considerations. He said the confidence interval is used for this constraint. This keeps the rate from being inadequate, excessive or unfairly discriminatory. He said the result of the optimization has to be a rate order calculation, meaning two customers with the same risk characteristics should get the exact same rate.
Mr. Guven said the actuary explores the simulated search space to identify potential price scenarios. Optimization identifies and summarizes a range of options in the search space. Rating algorithms may mix profit, volume or other aspects. Mr. Guven said a price scenario is identified to align with portfolio-level objectives.

Mr. Guven said the regulatory process remains the same with price optimization; i.e., rates should not be inadequate, excessive or unfairly discriminatory. He said optimization is a tool that helps make the selection; there is no easy way to see if a company is or is not using the tool, but a regulator can see if the selection deviates from the indication, showing that some form of optimization was used. He said the goal should be to ensure the selected rate is in line with regulation, not creating a rate that is inadequate, excessive or unfairly discriminatory. Mr. Guven said the selection should be between the current and indicated rates. If the rate is above or below the current and indicated rates, it is likely to be challenged by regulators. He said regulators might want to ask for a compilation of risk factor selections and compare the current price to the proposed price to identify dislocation. He said companies do not want too much dislocation because it hurts market continuity. He said regulators could compare selections to the cost-based model so the regulator can assess the change in subsidization if a change is made to the proposed rates. He said regulators might want to get an aggregate understanding of what a customer will see and how subsidization is minimized. He said price optimization is a scientific approach to rate selection and regulators should continue to ensure that the selections are actuarially justified.

Ms. Pallozzi asked what level of detailed data is needed in filings for regulators to understand what effect price optimization had on the rate. Mr. Guven said regulators should receive the selected discounts and surcharges for the rating factor compared to indicated discounts and charges and current discounts and charges. He said regulators might also want to ask for a confidence interval around the indicated rate. Ms. Pallozzi asked if it is possible for two individuals who were charged the same before price optimization to be charged a different rate after price optimization is used. Mr. Guven said two people with the same risk characteristics in the rate order calculation should have the same rate.

Mr. Serbinowski asked whether a retention score is a rating factor within the rating calculation. Mr. Guven said that, in his experience, it is not a rating factor. He said the retention score may be correlated with loss costs. He said policy tenure is correlated with loss costs. He said if the retention score is correlated with loss costs, then the retention score could be a rating factor rate order calculation. Mr. Serbinowski asked whether two consumers who differ in sensitivity to price could end up with different rates. Mr. Guven said this does not happen unless the rate order calculation includes a retention score as a rating factor.

Mr. Byrd asked whether reinsurance costs could be a business constraint. Mr. Guven said a scenario might involve an insurer growing by keeping profitability level, which could make reinsurance costs a business constraint. Commissioner Murphy asked how retention score is defined. Mr. Guven said a retention model creates a retention score given the characteristics and a rate change.

Commissioner Goldsmith asked how many and what types of characteristics are in a retention model. Mr. Guven said it depends on the data collected and the retention model. There could be
hundreds of characteristics in the model. He said the characteristics could be policyholder or transactional attributes, such as whether a person calls or complains or how a consumer interacts with either an agent or a distribution channel. He said the characteristics may be related to risk or demand. Commissioner Goldsmith asked if complaints could cause a consumer to get a worse retention score and higher premium. Mr. Guven said someone who complains would be considered to be more price-sensitive, so an increase in price would mean that consumer is more likely to leave the company.

Mr. Andring asked whether regulators should consider rates not excessive if the selections fall within the confidence interval. Mr. Guven said rates are actuarially sound around the indicated rate’s confidence interval.

Bob Hunter (Consumer Federation of America) asked whether the Study Group would accept written questions and comments. Commissioner Murphy said individuals could send in questions and comments through Aug. 8. Mr. Hunter said he disagrees with several assumptions found in Mr. Guven’s presentation. He said the Casualty Actuarial Society is currently trying to change the ratemaking standards of practice, because the current standards make price optimization problematic. He said some regulators have had objections to the changes, and California believes price optimization is illegal. Mr. Hunter said he disagrees with the notion that price optimization only removes bias from the current practices deviating from cost-based indications. He said price optimization clearly raises prices above cost-based levels. He said Mr. Guven has authored a paper showing that an optimized rate may be higher than the current rate. Mr. Hunter said he has never seen a filing that showed the selected rate 10% higher than the indicated rate, noting that this would not be approved by state regulators. He said there is no easy way for regulators to see if insurers are using price optimization. He said regulators need to understand the cumulative impact of rating factors. He said regulators need to require the necessary information from insurers to understand how much rates are being adjusted from cost-based levels and who is paying subsidies. He said low-income consumers need to be protected because they are required by law to purchase auto insurance and they have inelastic demand.

Commissioner Murphy said the Study Group is scheduled to meet Aug. 16 at the Summer National Meeting. He also said the Center for Insurance Policy and Research will host a panel discussion titled, “Commercial Ride-Sharing and Car-Sharing Issues,” which will be held Aug. 16 at the Summer National Meeting.

**August 16, 2014 Minutes**

Commissioner Murphy said the Study Group heard from Earnix during a March 17 conference call about price optimization. The Study Group then submitted questions to Earnix, and Earnix said it would respond by Aug. 29. He said Towers Watson also presented before the Study Group May 20 regarding price optimization. The Study Group agreed that similar follow-up questions should be submitted to Towers Watson.

Commissioner Murphy said because the topic of price optimization goes beyond auto insurance and requires a great deal of actuarial expertise, it is best suited before the Casualty Actuarial and Statistical (C) Task Force. He said the Task Force has also looked into the work of the Casualty
Actuarial Society, which is considering revising its Actuarial Standards of Practice. The Study Group decided to request that the Task Force draft a white paper on regulatory issues regarding price optimization.

Commissioner Murphy said J. Robert Hunter (Consumer Federation of America—CFA) had previously sent comments and questions to the Study Group regarding the Towers Watson presentation. Those comments have been posted and distributed. Mr. Birnbaum explained that he would like to respond to some of the assertions within the Towers Watson presentation. He said he would address three misconceptions: 1) insurers have always deviated from indicated rates, and price optimization is just a more scientific way of doing this; 2) rating factors are factors related to the transfer of risk and because price optimization is not related to the costs of transfer of risk, it is not a rating factor and, consequently, not subject to regulatory oversight; and 3) there is a statistical confidence interval around the indicated rate, and any selection based on management judgment within that confidence interval is actuarially sound. He said each of these contentions is erroneous. He said demonstrating the falsehood of any one of these assertions renders price optimization illegal and unfair under current statutory rate standards. He said demonstrating the falsehood of all three should make clear that regulators should take immediate action to stop price optimization under existing regulatory authority.

Mr. Birnbaum said it is correct that insurers have deviated from indicated rates in the past, but that deviation has not been anything like price optimization. He said historical deviation from rates has typically been an insurer selecting a lower rate than the indicated rate. He said regulators have not routinely approved insurer requests for rate increases significantly higher than the insurer’s indication. He said historical deviation from indicated rates has almost always been a lower selected rate than the indicated rate, and the lower selection has been across broad risk groups. Mr. Birnbaum said price optimization employs consumer-specific information to deviate from indicated rates not by broad risk groups, but by individual consumers. He said those deviations are as likely or more likely to be higher than indicated rates than lower than indicated rates.

Mr. Birnbaum said what drives price optimization is price elasticity of demand, meaning the rate charged is dependent on the consumer’s likely response to a higher rate. Price optimization means that an insurer will charge a higher rate to a consumer for whom the price optimization scoring model indicates the higher rate will not prompt the consumer to shop for insurance from other providers. He said this is not a symmetrical exercise in which some consumers will see lower rates while others will see higher rates. He said price optimization is optimization of price to maximize profit, so higher prices will be assessed on these consumers the insurer believes will accept prices greater than the expected and indicated cost of the transfer of risk.

Mr. Birnbaum said that historically, there was a clear demarcation between underwriting and rating factors. Underwriting used few and simple criteria to determine if an insurer would offer coverage and, if so, in which company coverage would be offered. Rating factors were any characteristic of the consumer, vehicle or property used to determine the premium charged for an individual policyholder. Historically, underwriting was left to the insurer and not subject to routine regulatory oversight, while regulators did require the filing of rating manuals and reviewed those rating manuals for compliance with the statutory requirement that rates not be
unfairly discriminatory. Mr. Birnbaum said some insurers began to use rating factors to create different base rates in order to call the rating factor a tier placement factor, declare it as part of underwriting and not tell regulators about it. He said instead of using a credit score as a rating factor with, for example, relativities of 0.75, 1.0 and 1.25 (reflecting a discount of 25%, base rate and a surcharge of 25%), the insurer could call the credit score a tier placement factor and have three sets of base rates: 25% below the average, the average and 25% above the average. He said there have been sessions at the Casualty Actuarial Society’s Annual Ratemaking Seminar instructing company actuaries how to use “tier placement” to avoid regulatory scrutiny.

Mr. Birnbaum said a rating factor is any characteristic of the consumer, vehicle or property that the insurer uses to determine the premium charge. Rating factors must be risk classifications to comply with statutory rate standards; that is, a rating factor must be related to the expected costs of the transfer of risk, expected losses or expenses to issue and administer the policy. He said that by this definition of a rating factor, price optimization is clearly a rating factor as it is based on individual consumer characteristics and is applied to individual consumers to determine the premium charge for that consumer. He said price optimization is an impermissible rating factor because it is not related to the cost of transfer of risk.

Mr. Birnbaum said the concept of a confidence interval around indicated rates misapplies a statistical concept to insurance ratemaking and regulation. The confidence interval is a function of choices the insurer makes in specifying the rate development model and, consequently, is subject to manipulation. He said it is incorrect that any rate within the confidence interval is as reasonable an estimate of the expected cost of risk transfer as the indicated rate.

Mr. Birnbaum said price optimization means higher prices predominantly for those low-income and moderate-income consumers least able to afford auto insurance because these are consumers living in communities with the least competition among auto insurers for business. He said price optimization means taking advantage of those with the fewest alternatives. He concluded that addressing price optimization is not only an issue of enforcing existing statutory standards regarding unfair discrimination, but also an issue essential to promoting greater affordability of insurance among those consumers for whom the cost of auto insurance is the greatest burden.