



PRICE OPTIMIZATION IN AUTO INSURANCE MARKETS

Actuarial, Economic and
Regulatory Considerations

Robert P. Hartwig, Ph.D., CPCU
President & Economist, Insurance Information Institute

Introduction

Good morning, Chairman Lehman and members of the Committee. My name is Robert Hartwig, and I am President and Economist for the Insurance Information Institute, an international property/casualty insurance trade association based in New York City. I am also a Chartered Property Casualty Underwriter (CPCU) and have worked on a wide variety of insurance issues during my 20-plus years in the property/casualty insurance and reinsurance industries. The Institute's members account for nearly 70 percent of all property/casualty insurance premiums written in the United States. The Institute's primary mission is to improve understanding of the insurance industry and the key role it plays in the global economy.

I am speaking to you today about price optimization, a concept that has gained a lot of attention in recent months, particularly in its application to the pricing of automobile insurance. My objective today is to provide the committee with useful information that will help you and the insurance-buying public better understand:

1. What price optimization is (and what it is not);
2. How it has historically been used in the property/casualty insurance industry;
3. How it is currently and routinely applied, without controversy, in pricing decisions in other industries;
4. How price optimization and changes in its permissibility could potentially affect insurance markets.

What is Price Optimization?

There has been significant discussion within the insurance industry and among regulators in recent months about the use of price optimization in the pricing of property/casualty insurance. A number of states, including Maryland, California, Ohio, Montana, Vermont and Florida have

gone so far as to issue bulletins specific to its use while a number of other states have issued requests for information.¹ Actions such as these are curious and surprising given the healthy and vigorously competitive nature of auto insurance markets, the absence of consumer complaints, the high degree of consumer satisfaction with auto insurers in general and perhaps most interestingly, the lack of a clear or consensus definition of what price optimization actually is. Stated differently, states have taken actions on the application of price optimization in the absence of any known, discernable or detectable market disruption and have done so using inconsistent definitions and justifications. The lack of a consensus definition has clearly sewn confusion and led states to question substantively different pricing techniques, some of which regulators had approved for decades, potentially leading to unintended and adverse market consequences for consumers. A summary of the various definitions of price optimization used by each state is included in the Appendix to this paper.

As a starting point, I will use a definition adapted from the insights of an actuarial task force of the National Association of Insurance Commissioners (NAIC).² The Task Force refers to price optimization as the use of “*sophisticated tools and models to quantify other business considerations such as marketing goals, profitability or policyholder retention.*” The Task Force adds that the “*advent of more sophisticated data mining tools and modeling techniques has allowed the use of more objective, detailed quantitative information about the judgmental aspects of the rate-setting process instead of reliance primarily on anecdotal evidence.*”

The use of actuarial judgment to make adjustments is neither new nor surprising. Rate indications are not produced in an economic vacuum. Considerations must also be made for market factors influencing the ability of the insurer to operate profitably in a highly competitive

¹ As of July 13, 2015.

² Casualty Actuarial and Statistical (C) Task Force, *Price Optimization White Paper*, May 19, 2015.

and highly regulated environment. As a practical matter, virtually every actuarial indication produced by every insurer in every line of insurance is subject to actuarial judgment. Regulators themselves routinely exercise both actuarial and political “judgment” when considering insurer rate requests. Both result in rates that are different from actuarial indications. It is worth noting that actuarial judgment is not restricted to pricing decisions. The establishment of claim reserves, while based on established actuarial methodologies, also requires actuarial judgment.

Actuarial Principles and Considerations in Property/Casualty Insurance Ratemaking

The use of judgment in ratemaking is universally recognized and accepted by regulators and falls within the scope of the actuarial standards of practice. Consider the following citations from the current Casualty Actuarial Society’s (CAS) *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, which refer to considerations related to Operational Changes and Other Influences related to ratemaking (emphasis added)³:

- **Operational Changes:** “Consideration should be given to operational changes in the **underwriting process**, claim handling, case reserving, **and marketing practices** that affect the **continuity of the experience**.” [Section III, Lines 114-117]
- **Other Influences:** “The impact of external influences on the **expected future experience should be considered**.” [Section III, Lines 118-119]

The CAS, in its conclusion on ratemaking principles, states clearly that business considerations are indeed part of ratemaking:

³ *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* (adopted by the Board of Directors of the Casualty Actuarial Society, May 1988): <http://casact.org/professionalism/standards/princip/spperate.pdf>

- **Conclusion:** “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 are also a part of ratemaking. By interacting with professionals from various fields including underwriting, marketing, law, claims, and finance, the actuary has a key role in the ratemaking process.**”

[Section IV, Lines 141-145]

The CAS’s conclusion with respect to price determination unequivocally supports the notion that ratemaking and pricing must incorporate a full range of relevant business considerations which reflect omnipresent market realities. It is an explicit acknowledgement that the indicated rate for an insurance product will in most circumstances differ from the market price. Rather than a violation of ratemaking principles, as has been asserted by some, it is entirely consistent with stated expectations of the price determination process.

Economics 101: The Ubiquitous and Uncontroversial Nature of Price Optimization

The use of price optimization techniques is generally uncontroversial in the pricing of products and services in other industries. It is, in fact, widely applied in most markets. In many markets pricing is dynamic—prices change frequently and in some cases continuously—in response to changes in supply and demand conditions. Airlines, hotels, rental cars, gasoline, electricity, movie theaters, food producers and vendors, fashion retailers, concert or sporting events—even transportation network companies such as Uber—are just a few of the industries that actively adjust prices according to supply and demand. Despite its prevalence in other markets, there is no insurer operating in the United States today that operates using such instantaneous, dynamic pricing models nor has any insurer indicated interest in adopting such a model.

That prices change to reflect underlying supply and demand considerations is hardly surprising—it is a fundamental tenet of competitive markets—and a concept that is at that core of every Economics 101 course. Insurance markets, in contrast, are far more constrained in terms of pricing. Prices change only infrequently (e.g., once per year) and even those changes are often limited by regulators. Optimization techniques in insurance lead to small changes relative to many other industries. Moreover, unlike in other industries, price optimization in insurance is applied only to classes of consumers, rather than individual consumers. In other words, two individuals “of the same [risk] class and of essentially the same hazard”⁴ will pay the same amount for insurance.”

Auto insurance markets are unusually favorable from the perspective of consumers—and regulators. Markets are not only highly competitive but prices are highly stable, changing infrequently and gradually. Few markets in which consumers routinely purchase products or services exhibit such a high degree of competition *and* price stability. And at the same, the rates that insurers do charge are not inadequate, excessive or unfairly discriminatory.

Regulators Dilemma?

Regulators face what seems like a dilemma when it comes to price optimization. On one hand, they are bound by laws and regulation to ensure that rates are not excessive, inadequate or unfairly discriminatory. The rules seem to insist that prices should hew precisely and in an undeviating manner to actuarial models, where they exist, ensuring that rates are based on the insurer’s risks and expenses, and include a load for reasonable profit—and nothing else.

⁴ NAIC Model Laws, Regulations and Guidelines 880-1, § 4G. See also Ohio Department of Insurance, Bulletin 2015-01, *Price Optimization*, January 29, 2015.

At the same time, regulators have always understood that the insurance marketplace is competitive and complex, that market forces operate in ways that standard actuarial models do not account for. Consequently, regulators have likewise always recognized that insurers require some latitude and flexibility in their pricing decisions in order to preserve the economic viability of individual insurers and foster competitiveness in the broader insurance marketplace.

The classic example in the private passenger auto line occurs among young drivers. As high as rates are on newly licensed drivers, those rates would be higher still if companies did not exercise judgment and instead took the full rate indication for this class of driver. Many companies, however, know that the decision to renew a policy lies not with the teen driver but with the parent. They do not want to lose the parent as a customer, so the youthful driver pays less than he or she should in a strict actuarial-based pricing world. That decision means everyone else subsidizes the young driver. Regulators have never objected to this pricing behavior, which strays from strict adherence to indicated rates but reflects market realities.

Regulators and legislators themselves frequently order that prices deviate from actuarially indicated rates to achieve public policy goals. For example, a few states limit the use of gender as a rating factor, even though actuarial modeling shows a powerful relationship between gender and driving record. States also have restricted rate increases on classes or territories. And they have capped individual rate changes to limit the increase that any insured will experience—capping rate increases for coastal dwellers exposed to hurricane risk, for example. These examples may not sound like price optimization, but they are all examples of rates being adjusted for reasons other than the insurer's expected losses and expenses. It would therefore seem that the regulators' dilemma is hardly a dilemma at all. Market and public policy-based departures from pure actuarial rates, by insurers and regulators alike, are recognized by all parties as necessary concessions to marketplace realities.

All of this suggests that the best way for regulators and public policymakers to manage the use of optimization technologies in insurance pricing is not through prohibitions but through observation, learning and studying the impacts on insurance markets and consumers and only then making recommendations as necessary.

Innovation in Pricing Models

Insurers for centuries have sought to estimate rate need through the application of various analytical tools, techniques and judgment. In the early days of insurance, rate need was determined using simplistic, imprecise and oftentimes subjective processes that relied heavily on judgment. Over time, with scientific advancements in the understanding of risk coupled with technological innovations in computing power and the expansion in the data available to analyze risks, the modeling of expected losses and rates has increased in both sophistication and precision. The inexorable advance of technology continues unabated, perhaps even at an accelerated pace, to this day.

The use of sophisticated demand-based models is nothing more than a recent innovation in pricing sophistication. As with all previous advances and innovations, the application of these models serves to increase the rigor associated with pricing decisions, reduces reliance on judgment and the inherent biases that often accompany decisions that rely heavily on judgment. Consequently, insurers gain a deeper understanding of the risks they assume and can price those risks more efficiently. Such advances benefit policyholders, insurers, regulators and public policymakers alike.

Technological advances in computing power, data storage and analytical techniques have sparked advances in quantitative modeling in virtually every industry, including insurance. These

advances help companies better understand how to manage their businesses in many ways. Insurers have pioneered, for example, the field of catastrophe risk modeling providing insurers with a much better understanding of the potential impacts of catastrophic events. Rates now better approximate risk than was the case before such models became ubiquitous and insurers are financially stronger and policyholders better protected as a result. However, when first introduced, such models were routinely attacked by industry critics and some regulators as “black boxes,” developed by insurers to pad profits. That was not, of course, the case.

Experience demonstrates that the advance of new technologies and insurers’ embrace of those technologies has always been consistent with regulators’ mission to protect policyholders. The use of price optimization is no different. Randomness in pricing is reduced as the role of judgment is diminished. Rate stability is enhanced as result. As the NAIC Task Force on price optimization points out, rate stability can lower an insurer’s cost of providing coverage over the long run (customer acquisitions costs will be lower) leading to larger policyholder longevity discounts over time. Importantly, markets remain extremely price competitive with insurers willing and able to satisfy the demand of customers with an ever increasing array of products and services.

Addressing the Criticisms Associated with Price Optimization

Sophisticated demand-based modelling such as price optimization can help increase the precision of insurance pricing by reducing the role of judgment and therefore enhancing rate stability over time. Despite the benefits to consumers, some have argued that the use of demand-based models as part of the price determination process should not be permitted. In this section the principle objections to the use of demand-based considerations and price optimization specifically are addressed.

Rates Remain Risk Based

The principal objection to price optimization is the perception that its use represents an abandonment of cost-based pricing because factors other than risk are incorporated into the price determination process. This assertion is incorrect, as the following facts make clear:

- Insurers develop and file their rating plans in a manner that is consistent with state rating laws, which require the consideration of risk in the determination of rate and price.
- The inclusion of “*other business considerations*” is explicitly permitted and recognized by the actuarial profession and codified in the Casualty Actuarial Society’s *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*.
- All insurers continue to use traditional rating variables such as driving record, type of vehicle, vehicle location and many more.
- The accuracy of rates is increasing, not decreasing, over time through the continuous improvement in rating and pricing models.
- Auto insurance markets are extremely competitive. Insurers compete intensively on price, quality of service, financial strength and many other factors across every class of driver.
- Auto insurance markets today allow customers to collect and compare more quotes from competing insurers more quickly than at any time in history.

There is no question that insurance rates are fundamentally driven by risk and that the market price for insurance necessarily also reflects the realities of operating in highly a competitive marketplace. Insurance markets have always functioned in this manner—and always will. And insurance regulators have always recognized this fact.

Basic economics also assures that insurance pricing remains firmly and fundamentally risk based. Highly competitive markets, such as auto insurance, are efficient and drive competitors out of

markets where prices deviate substantially from cost-based pricing (which includes a provision for a reasonable profit). In the context of auto insurance, pricing is highly transparent and no insurer could operate on a sustained basis unless rates and prices were ultimately driven by risk. Carriers offering products not priced to reflect actual costs will be quickly eliminated from the market, either because their products are overpriced and market share shrinks rapidly or because their products are underpriced, leading to a rapid deterioration in financial performance and eventually an inability to function as a going concern.

Models Reduce Uncertainty

Some critics of price optimization have suggested that the models are subjective and are easily manipulated. The reality, as has been discussed previously, is that price optimization reduces subjectivity by reducing the reliance on judgment in pricing decisions and the inherent biases that occur in complex decision-making processes involving significant degrees of judgment.

Again, no evidence has been provided by critics to substantiate claims that pricing remains adversely impacted by the inclusion of optimization techniques in pricing. Rates still adhere to the universal regulatory standard that they are not excessive, inadequate or unfairly discriminatory.

Price Optimization Does Not Discriminate Against Low Income and Minority Consumers

Critics of price optimization have alleged, without providing any supporting evidence, that it use leads to discrimination against low income and minority consumers. This assertion is based on the apparent belief held by industry critics that such consumers do not or cannot shop for insurance. This unfortunate stereotype is not supported by the data.

A 2014 national survey by the Insurance Information Institute found that 68 percent of consumers with incomes under \$35,000 shopped for insurance (with an agent, online or by telephone) the last time their policy was up for renewal compared 61 percent of consumers with incomes about \$100,000 (Figure 1). Moreover, the same survey found that 90 percent of consumers with incomes under \$35,000 think they have *more* choices today for auto insurance than they did ten years ago (Figure 2).

With respect to minority consumers, a June 2015 study by the Insurance Research Council found that black respondents to a survey on auto insurance shopping behavior were more likely to have shopped for auto insurance than any other racial or ethnic group. Thirty-three percent of black respondents said they had shopped for auto insurance within the past 12 months compared to 24 percent of whites and 22 percent of Hispanic respondents (Figure 3).⁵

Price Optimization and “Big Data” Are Two Different Things

Critics of price optimization have tended to conflate the public’s fears over “Big Data” with the use of price optimization techniques in the insurance industry. Although we live in the “Information Age” and more data and information are available everywhere, at all times to everyone—including insurers and consumers—the fact remains that insurers collect, analyze and use information in accordance with applicable state rating laws and actuarial principles. That the volume of available data has increased does not in any way relieve insurers or regulators of their responsibility to ensure that rates are not excessive, inadequate or unfairly discriminatory. Insurers remain transparent and responsive to regulator requests for more detailed information on rating plans and pricing models.

⁵ Insurance Research Council, *Shopping for Auto Insurance and the Use of Internet-Based Technology*, June 2015.

Conclusion

An actuarial task force of the National Association of Insurance Commissioners noted that price optimization lets companies rely on “more objective and detailed, quantitative information about the judgmental aspects of the rate-setting process instead of reliance primarily on anecdotal evidence.” Consumers benefit because the reduction in judgment reduces uncertainty, enhances price stability and can lower an insurer’s cost of providing coverage over the long run leading to larger policyholder longevity discounts over time. As applied by insurers, its use falls within the requirements set forth by state rating laws and actuarial ratemaking principles. Rates remain fundamentally determined by risk, adhering to the standard that they are not excessive, inadequate or unfairly discriminatory. Importantly, markets remain extremely price competitive with insurers willing and able to satisfy demand with an ever increasing array of products and services to all categories of consumer, irrespective of income.

This summary of the *reality* of auto insurance markets today is juxtaposed with a starkly different characterization offered by critics of price optimization. Specifically, critics of models such as price optimization have depicted auto insurance markets today as one in which pricing has become almost completely untethered from risk, asserting that the models used are highly subjective, routinely manipulated and produce whatever number the insurer desires. Big Data has run amok. In this characterization, insurers gouge consumers at every opportunity and the poor bear the brunt of the burden.

Clearly, these characterizations of auto insurance markets today bear no semblance to the actual state of insurance ratemaking, pricing and competition and serve only to spread fear and confusion as demonstrated by recent bulletins on the use of price optimization in several states, all of which have defined price optimization differently. Consequently, states have restricted substantively different pricing techniques, some of which regulators had approved for decades,

potentially leading to unintended and adverse market consequences for consumers—all in the absence of any detectable market problems.

Innovation is good for insurance consumers. History has made this point abundantly clear. Current market conditions likewise underscore the point that innovation fosters competitive markets.

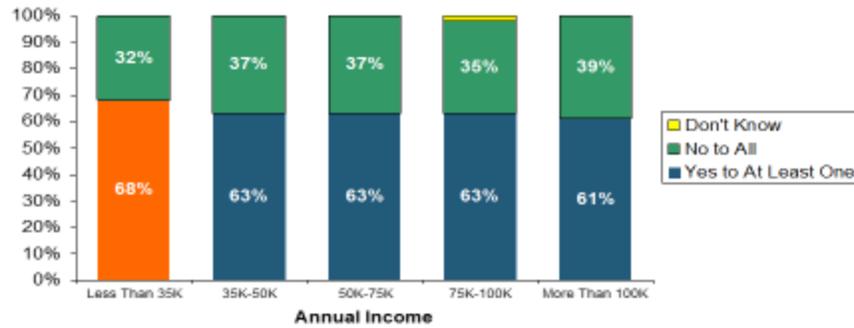
All of this suggests that the optimal way for regulators and public policymakers to manage the use of optimization technologies in insurance pricing is not through prohibitions but through observation, learning and studying the impacts on insurance markets and consumers and only then making recommendations as necessary.

FIGURE 1

I.I.I. Poll: Shopping for Insurance



Q. When your auto insurance policy was up for renewal did you compare prices at different insurance companies in any of the following ways (Phone, Online, Agent)?



Almost Two-Thirds of Respondents Said They Compared Prices For Auto Insurers at Different Companies. Lower-Income Respondents Were More Likely to Have Comparison Shopped.

Source: Insurance Information Institute Annual Pulse Survey, May 2014.

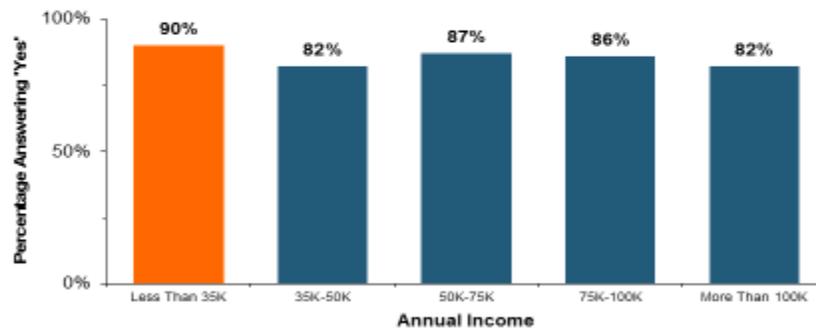
1

FIGURE 2

I.I.I. Poll: Shopping for Insurance



Q. Do you think you have more choices today among auto insurers than people had 10 years ago?



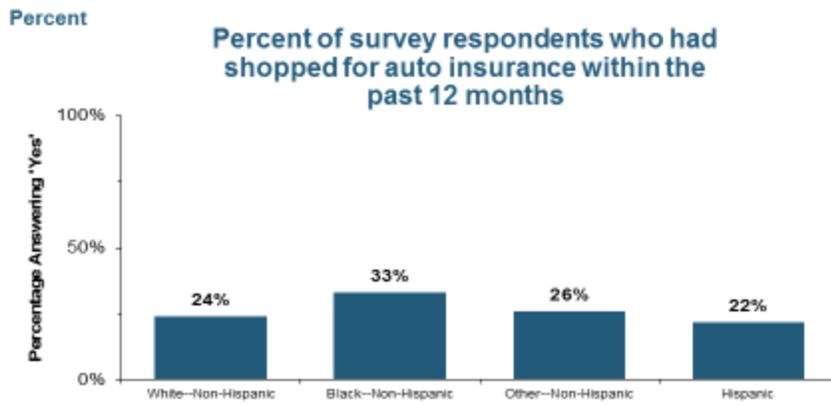
The Vast Majority of People Say They Have More Choices Among Auto Insurers Today vs. 10 Years Ago. Lowest-Income Americans Are the Most Likely to Say So.

Source: Insurance Information Institute Annual Pulse Survey, May 2014.

2

FIGURE 3

Auto Insurance Shopping by Race/Ethnicity



Source: Insurance Research Council, *Shopping for Auto Insurance and the Use of Internet-Based Technology*, June 2015.

APPENDIX

Price Optimization Defined... 

<p>■ Earnix (P.O. Vendor):</p> <ul style="list-style-type: none">♦ “systematic and statistical method to help an insurer estimate a rating plan factoring in a competitive environment.”♦ “using mathematical algorithms to determine optimal values of rating factors to meet business goals and constraints.”	<p>■ Maryland:</p> <ul style="list-style-type: none">♦ “...[V]arying rates based on <u>factors other than risk of loss</u>, including, but not limited to:<ul style="list-style-type: none">– a) The likelihood that a policyholder will <i>engage in activities that result in policy turnover</i>; and– b) The willingness of a policyholder to pay a higher premium compared to other policyholders.”
---	---

Price Optimization Defined... 

<p>■ Ohio:</p> <ul style="list-style-type: none">♦ “While price optimization has no absolute definition, it generally refers to an insurer’s practice of <u>varying premiums based upon factors that are unrelated to risk of loss in order to charge each insured the highest price that the market will bear.</u>”	<p>■ Florida:</p> <ul style="list-style-type: none">♦ “...a process for modifying the insurance premium that would otherwise be charged to an insured or class of insureds in order to <u>maximize insurer retention, profitability, written premium, market share,</u> or any combination of these while remaining within real world constraints.”
--	---

Price Optimization Defined...



■ California:

- ♦ "...any method of taking into account an individual's or class's **willingness to pay a higher premium** relative to other individuals or classes."

■ New York:

- ♦ "...the practice of varying rates based on **factors other than those directly related to risk of loss**, for example, setting rates or factors based on an insured's likelihood to renew a policy or on an individual's or class of individuals' perceived willingness to pay a higher premium relative to other individuals or classes"

Price Optimization Defined...



■ Vermont:

- ♦ "...While there is no universally-accepted definition of price optimization, the practice, in some of its applications, **involves the judgmental use of factors not specifically related to a policyholder's risk profile** to help determine or adjust his or her insurance premium."

■ Washington State:

- ♦ "...price optimization involves an insurer's **use of sophisticated statistical analysis, often using non-insurance data**, to predict a policyholder's likelihood of renewing a policy."