

Potential Bias in Marketing and Underwriting Practices in Property and Casualty Insurance: Implications for Pricing Actuaries

JUNE 2026

Key Points

- Marketing and underwriting practices can unintentionally introduce statistical bias, proxy discrimination, or disproportionate impact, shaping the insurer's risk pool in ways that influence pricing outcomes.
- Underwriting guidelines and discretionary decisions may embed human or systemic bias, especially when criteria correlate with demographic patterns or when subjective judgment is applied inconsistently.
- Pricing actuaries play a critical role in identifying and mitigating unfair discrimination, requiring ongoing monitoring, cross-functional collaboration, and fairness testing to ensure equitable and credible pricing models.

An insurance company's operations are generally designed to implement a strategy aligned with the clients they aim to serve. This includes identifying those clients' needs, developing insurance products tailored to appeal to them, and determining ways to differentiate the products and services offered by competitors. Differentiation can take many forms, including coverage terms, pricing, distribution channels, and advertising strategies. For example, some companies may offer basic coverage terms, effectively marketed to individuals seeking the lowest price. Others may provide more comprehensive coverage and additional support services, targeting a market segment with more complex needs and a willingness to pay for higher service levels.

The awareness and accessibility of a company's offerings to potential customers fall within the scope of marketing. Within regulatory limits, insurers are generally allowed to accept or decline individual applications, making risk selection—or underwriting—a critical component of their success. While this discussion addresses marketing and underwriting activities in both personal and commercial lines, it is essential to recognize the close connection between marketing, underwriting, and pricing.

Actuaries play a central role in developing rating plans. Since pricing decisions are sometimes influenced by factors beyond rating plans, as explored in this paper, and given the interconnected nature of pricing, marketing, and underwriting, actuaries and regulators must continually consider these relationships.



1850 M Street NW, Suite 300
Washington, DC 20036
202-223-8196 | www.actuary.org

Geralyn Trujillo
Senior Director, Public Policy

Marketing, underwriting, and pricing collectively shape an insurer's book of business and, in doing so, have the potential to introduce unintended bias. Here, bias is defined as a systematic pattern in data, models, or processes that disadvantages or excludes certain groups, whether intentionally or unintentionally. This paper illustrates the potential for various marketing and underwriting practices to introduce bias in the insurance process.

Defining Bias and Discrimination

Bias can be difficult to recognize and takes many forms. In 2022, the National Institute of Standards and Technology (NIST) outlined [three broad categories](#) of bias:

- **Systemic bias** results from procedures and institutional practices that systematically favor some social groups while disadvantaging others. These may not be intentional but can stem from existing rules and norms. This is also called institutional or historical bias.
- **Statistical and computational bias** stems from systematic errors in data, often due to non-representative samples or flawed input variables, and can arise even without discriminatory intent.
- **Human bias** reflects consistent cognitive errors in how individuals interpret information or make decisions, such as confirmation bias or anchoring.

In the insurance context, the term *algorithmic bias*, where models reproduce or amplify inequities present in the training data, is frequently used to encompass the combined impacts of systemic and statistical biases. Human biases also have the potential to influence decisions made by insurance professionals in ways that can have a significant impact on consumers.

Members of the P&C Committee on Equity and Fairness who wrote this paper include:

Chairperson Tyson Mohr, MAAA, ACAS, FSA; Vice Chairperson Devyn McNicoll, MAAA, ACAS; Dorothy Andrews, MAAA, ASA; Steven Armstrong, MAAA, FCAS; Rose Barrett, MAAA, FCAS; Mallika Bender, MAAA, FCAS; George Davis, MAAA, FCAS; Kwame Davis, MAAA, FCAS; Kevin Dyke, MAAA, FCAS; Nathan Dykstra, MAAA, FCAS; David Heppen, MAAA, FCAS; David McMichael, MAAA, FCAS; Tara Miller, MAAA, FCAS; Rosemary Peck, MAAA, ACAS; David Reyes, MAAA, FCAS; Sandra Schrader, MAAA, FCAS; Benjamin Tucker, MAAA, ACAS; and Gary Wang, MAAA, FCAS.

Special thanks to the drafting group: Mike Woods, Susan Kent, George Davis, and Mallika Bender.

Discrimination—distinct from, though related to bias—refers to unfair or unequal treatment based on protected characteristics such as race, gender, ethnicity, or age. For the purposes of this paper, discrimination is defined as:

- **Unfair discrimination**, when classes of policyholders are treated differently without actuarial justification.
- **Proxy discrimination**, where neutral variables serve as stand-ins for protected characteristics, leading to similar exclusionary outcomes.
- **Disproportionate impact**, where facially neutral practices disproportionately harm protected groups, regardless of intent.

Biases across any of these categories can affect the insurance process and the work of actuaries. The Academy's 2023 issue brief, [*Approaches to Identify and/or Mitigate Bias in Property and Casualty Insurance*](#)¹ explores techniques to help actuaries detect and address unfair discrimination and unintended bias in rating. It highlights the challenges actuaries face, particularly the lack of data needed to fully understand or prevent such outcomes.

These challenges are compounded when historical data underpins pricing analysis. While marketing and underwriting practices can effectively shape a profitable book of business, they may also lead to bias, especially if certain rating variables are banned. In such cases, companies may alter their marketing or underwriting to avoid potential policyholder segments where they believe pricing will be less accurate, which could negatively affect affordability and availability, undermining the original purpose of the restrictions.

While this paper focuses primarily on marketing, underwriting, and pricing, it's important to acknowledge that other insurance operations—such as fraud detection, claims handling, service levels, and fee schedules—may also introduce systemic, statistical, or human bias.

Understanding Potential Bias in Marketing and Pricing Implications

Marketing practices may, intentionally or unintentionally, influence an insurance company's mix of policyholders and the data that forms the basis for actuarial pricing. Pricing actuaries should acknowledge the potential downstream impact that biases in marketing may have on pricing outcomes.

Ad Impressions and Demographics

Direct mail, digital, and TV advertising can all be tailored to target audiences from different demographic groups, such as by age, gender, geography, or household income. If some demographic groups see fewer ads than others due to targeted marketing approaches, proxy discrimination (e.g., geography serving as a proxy for race or income) or disproportionate impact (e.g., underexposure of protected groups) could be a concern. If the pool of customers exposed to an ad is not representative of the insurable population, this could create statistical bias in the data used for pricing, potentially leading to underestimates or overestimates of risk for certain demographic groups. It is important to note that such targeting could be aligned with the company's risk appetite while still resulting in unintended consequences.

Human biases could also influence the content of advertisements across all platforms. For example, images of customers could all feature members of a certain racial or gender group or ads could only be shown in English. This can discourage applicants from certain demographic groups, also leading to statistical bias in pricing data.

Lookalike Audiences and Customer Data

Some online platforms have systems that allow advertisers to create highly specific target audience groups by inputting characteristics based on their current customer base. One example of this is Facebook's "Lookalike Audiences" tool. Beyond general ad targeting, companies may also promote available discounts to reach groups they know are more likely to seek out discounts when shopping for insurance. Such practices could perpetuate statistical bias, and potentially result in proxy discrimination, if the existing customer base lacks demographic diversity. Pricing actuaries should consider how this bias might skew the risk pool under evaluation and lead to pricing models that produce less credible predictions for underrepresented groups.

Quote Distributions Across Sales Channels

Insurance shoppers have a variety of options when requesting an insurance quote, including direct online quoting tools or comparative rating tools, direct calls to company sales staff, or shopping in-person with an insurance agent. Utilization of these different sales channels likely varies by demographic group.

For example, younger customers may prefer online shopping and comparative rating tools. Comparative rating tools may be adjusted to only provide certain policy options, even if a company offers more options (e.g., not providing a quote for liability-only policies in the tool). This could result in statistical bias if the demographic groups with heavier utilization of these tools are more likely to look for that type of coverage.

Insurance agents may have a greater or smaller presence in different geographic areas. To the extent that these areas have different concentrations of demographic groups, a company's book of business may be skewed because of its agency footprint. This could lead to statistical bias and/or proxy discrimination. Agents are also highly skilled at identifying discounts and policy options that will help their customers adequately cover their risk at the best price. Such information may not be as readily available to those who shop online or over the phone. In this case, shoppers from different sales channels—each of which may carry its own demographic bias—may not be receiving discounts they are eligible for. This could result in unfair discrimination, to the extent that discounts are intended to recognize the lower risk of insurance loss for eligible policyholders.

Understanding Potential Bias in Underwriting and Pricing Implications

For decades, insurers have applied rating plans as a key step in evaluating a customer's risk. Over time, those rating plans have become increasingly sophisticated, incorporating more variables, using larger data sets, and relying on more advanced algorithms. However, application of a rating plan does not necessarily comprise the totality of an insurer's process for pricing a risk exposure or for deciding whether to offer coverage for that exposure. Risk submissions may be checked against underwriting guidelines before a rating process is applied. Rules applied during the pricing process may flag a risk for review by an underwriter. And in some cases, underwriting plays a role in determining the price quoted for the exposure. Underwriting decisions directly shape risk segmentation, and therefore pricing. Pricing actuaries should consider where bias or discrimination may arise in the underwriting process.

Underwriting Guidelines

Many underwriting guidelines incorporate discrete parameters. See exhibits 1 and 2 for examples of underwriting guidelines for a personal auto and a homeowners policy for a fictitious insurance company. Criteria such as roof age or violation counts appear objective but may correlate with demographics, which could produce proxy discrimination and disproportionate impact. For example, an age of construction cutoff that excludes older homes may systematically reduce those risks from minority neighborhoods from the insured pool, biasing loss experience. Other subjective criteria, such as “pride of ownership,” could be influenced by human bias.

Exhibit 1 – Example Underwriting Guidelines for a Personal Auto Policy

1. Eligibility Criteria

- **Driver Age:**
 - Minimum age: 16 years (with parental consent if under 18).
 - Maximum age: 75 years.
 - Drivers over 70 may require a recent medical exam confirming fitness to drive.
- **Driver’s License:**
 - Must hold a valid U.S. driver’s license.
 - No permit holders unless accompanied by a fully licensed adult (parent/guardian for minors).
- **Driving Experience:**
 - Minimum of one year of licensed driving experience.
 - New drivers (less than one year of experience) may be required to complete a defensive driving course.

2. Driving Record

- **Accidents:**
 - No at-fault accidents in the last three years for preferred rates.
 - Maximum of one at-fault accident in the last five years for standard rates.
- **Traffic Violations:**
 - No more than two minor violations in the past three years.
 - No major violations (DUI, reckless driving) in the past five years.
- **Claims History:**
 - No more than one comprehensive or collision claim in the last three years.

Exhibit 2 – Example Underwriting Guidelines for a Homeowners Policy

1. Property Eligibility

- **Property Type:**
 - Single-family homes, duplexes, and townhouses.
 - Condominiums (require a separate condo policy).
 - Exclude: Mobile homes, vacant properties, homes under construction (require a builder's risk policy), and homes used for business purposes.
- **Property Value:**
 - Minimum insured value: \$100,000.
 - Maximum insured value: \$1,500,000 (higher limits may require special underwriting approval).
- **Property Age:**
 - Homes up to 50 years old.
 - Homes older than 50 years require proof of recent updates to key systems (roof, electrical, plumbing, HVAC).
- **Construction Type:**
 - Frame, brick, stucco, or stone construction.
 - Exclude: Log homes, homes with unconventional materials, or historic properties.

2. Condition of the Property

- **Roof:**
 - Must be in good condition with no more than 30 years of age.
 - Flat roofs or those older than 30 years require inspection or replacement.
- **Plumbing:**
 - Must be up to code with no known leaks.
 - Homes with outdated or hazardous materials (e.g., polybutylene pipes) require replacement.
- **Electrical:**
 - Must be up to code with no knob-and-tube or aluminum wiring.
 - Circuit breakers preferred over fuses.
- **Heating and Cooling:**
 - Must have a central heating system.
 - No wood stoves.

Program or Company Differentiation and Tiering

Insurers sometimes operate multiple programs—sometimes using multiple companies to accomplish this—with different rating plans and underwriting guidelines. Additionally, an insurer may offer a program with different rates for underwriting tiers within that program. Using multiple underwriting programs, or multiple underwriting tiers within a single program, can unintentionally lead to unfair discrimination if customers from protected groups are disproportionately placed in higher-priced programs or tiers without legitimate risk justification. This is particularly challenging when underwriting guidelines between programs are not mutually exclusive. Pricing actuaries should validate that this type of placing business into separate programs or separate underwriting tiers within a program aligns with credible risk differences.

Underwriter Decisions

Human judgment in approving risks or requiring additional underwriting steps, such as property inspections, can introduce human bias. If a property inspection trigger correlates with protected attributes (e.g., certain ZIP codes), this may create unfair discrimination.

A more explicit area of judgment arises when pricing commercial risks in situations where a rating plan allows for scheduled debits or credits. Commercial risks may have attributes that are unique or unusual, or have characteristics that are difficult to quantify or categorize. Factors such as staff training or the condition of premises may be judged by the underwriter as the basis for applying a debit or credit to adjust a price up or down from what the rating plan otherwise indicates. Large commercial risks will often have complexity and sophistication for which insurers are allowed to use individual risk rating approaches. Pricing adjustments based on qualitative attributes (like those mentioned above) may be inconsistently applied, risking human bias and unfair discrimination. Pricing actuaries should monitor and document such adjustments to avoid systematic disparities.

How Pricing Actuaries Could Integrate Fairness Considerations

Pricing actuaries can integrate fairness by implementing robust data monitoring and assessments, specifically testing for proxy discrimination and disproportionate impact to ensure protected groups are represented fairly and do not receive systematically higher premiums. In addition, working with underwriting, marketing, and compliance can help actuaries understand discretionary practices and data limitations, improving fairness assessments. Working with these teams could include partnering with underwriters to scrutinize how discretionary risk selection might introduce bias, coordinating with marketing to ensure that pricing incentives do not inadvertently target or exclude specific demographics, and consulting with compliance to identify the legal limitations of the data being used.

Furthermore, actuaries can stay informed about changing rules on unfair discrimination and actively contribute to these standards by participating in industry working groups, responding to regulatory calls for comment, or providing technical feedback on the feasibility of proposed fairness metrics.

Ultimately, fairness evaluation is a perpetual task, requiring actuaries to commit to continuous improvement by staying current with emerging research and methods to mitigate bias in pricing models.

Conclusion

The marketing and underwriting practices employed by insurers are integral to shaping their customer base and ensuring financial stability. However, as explored in this paper, there is potential for these practices to inadvertently introduce or amplify bias, through mechanisms such as statistical bias, proxy discrimination, disproportionate impact, or human subjectivity. The extent to which these effects occur may vary, depending on specific strategies, datasets, and operational decisions. Marketing strategies—whether through targeted digital campaigns, agent presence, or advertising content—may lead to disparities in awareness or access. Underwriting processes, such as risk acceptance criteria or tiered pricing, could result in different outcomes across demographic groups. Further study and careful analysis are often needed to determine whether such differences constitute bias or are instead reflective of other risk-based or contextual factors.

Identifying bias is inherently complex, as outcomes can be influenced by a wide range of variables beyond the control of insurers, such as historical data limitations or regional variations in customer behavior. There are tools and techniques that can help identify whether differences in outcomes exist among demographic groups. However, the presence of such differences does not necessarily indicate bias. Rather, they should serve as starting points for further investigation into whether adjustments to practices are warranted. Explicitly defining “bias” and “discrimination”, as well as their different forms, is a critical first step in this process, providing the foundation for meaningful evaluation and response.

Given the interconnected nature of marketing, underwriting, and pricing, a cautious and comprehensive approach to evaluating potential impacts is necessary. Efforts to address bias in one area without considering the broader system may lead to unintended consequences elsewhere. Pricing actuaries have a vital role to play. By incorporating fairness considerations into model development and evaluation, actuaries can help create accurate, equitable pricing frameworks that align with policies supporting broad, inclusive access to insurance. As such, insurers may benefit from ongoing reviews of their practices and close collaboration with regulators and other stakeholders to ensure fair and responsible outcomes.

Related resources:

American Academy of Actuaries Issue Briefs

- [*Sourcing Protected Class Information in P&C Insurance*](#)
- [*Approaches to Identify and/or Mitigate Bias in Property and Casualty Insurance*](#)
- [*An Actuarial View of Data Bias: Definitions, Impacts and Considerations*](#)
- [*Insurance Fraud: Impacts on Premiums, Claim Costs, and the Public*](#)
- [*Climatic Events, Inequities and Risk Mitigation*](#)

Casualty Actuarial Society Research Paper Series on Race and Insurance Pricing

- [*Approaches to Address Racial Bias in Financial Services: Lessons for the Insurance Industry*](#)
- [*Defining Discrimination in Insurance*](#)
- [*Methods for Quantifying Discriminatory Effects on Protected Classes in Insurance*](#)
- [*Understanding Potential Influences of Racial Bias on P&C Insurance: Four Rating Factors Explored*](#)
- [*A Practical Guide to Navigating Fairness in Insurance*](#)
- [*Regulatory Perspectives on Algorithmic Bias and Unfair Discrimination*](#)
- [*Balancing Risk Assessment and Social Fairness: An Auto Telematics Case Study*](#)
- [*Comparison of Regulatory Framework for Non-Discriminatory AI Usage in Insurance*](#)
- [*Practical Application of Bias Measurement and Mitigation Techniques in Insurance Pricing \(Part 1 – Types of Bias, Imputing Protected Class, and Simple Fairness Tests\)*](#)
- [*Practical Application of Bias Measurement and Mitigation Techniques in Insurance Pricing \(Part 2 – Advanced Fairness Tests, Bias Mitigation, and Non-Modeling Considerations\)*](#)
- [*Potential Unintended Impacts of Bias Mitigation in a Competitive Insurance Market*](#)

The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 60 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

This paper was developed thanks to the work of the Academy's volunteers. To learn more about becoming a volunteer, please visit actuary.org/volunteer.