Casualty Actuarial and Statistical (C) Task Force "Book Club"

Dorothy L. Andrews, MAAA, ASA
Chair, Data Science and Analytics Committee (DSAC)

February 23, 2021

Agenda

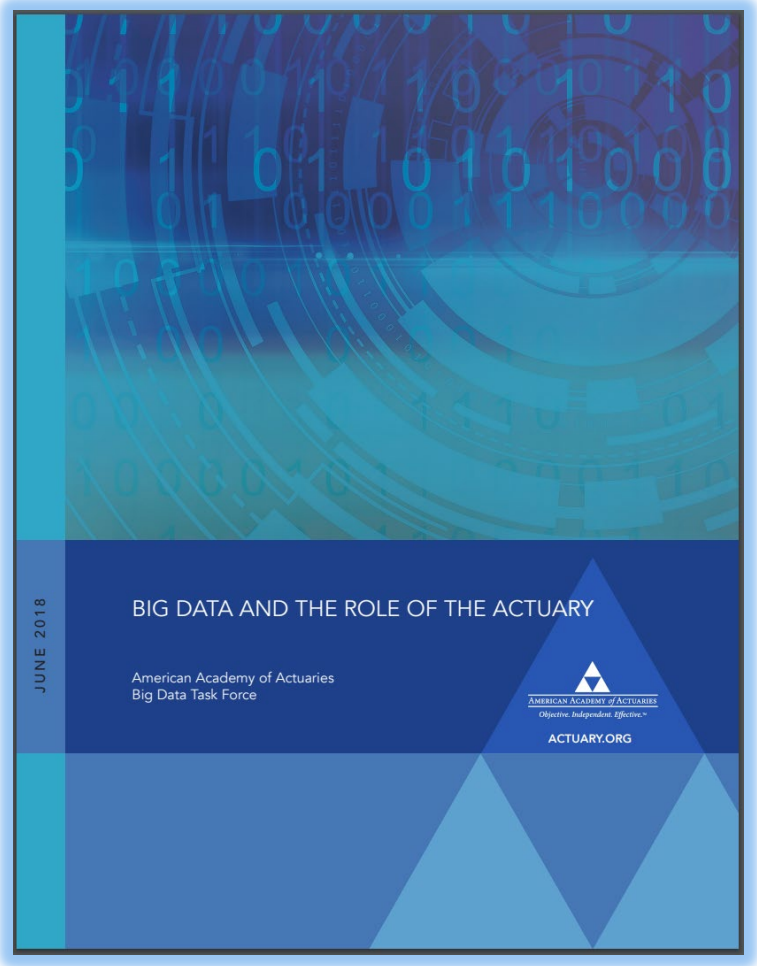
- The Year in Review
- Presentation to National Council of Insurance Legislators (NCOIL)
  - Genesis of DSAC
  - Challenges of Data Scientists
  - Big Data & Artificial Intelligence (AI) White Paper
  - The Use of Big Data and Algorithms in Actuarial Modeling and the Impacts on Consumers Issue Brief
- DSAC White Paper
- DSAC Issue Brief
- Plans for 2021

2020 – The Year in Review

We spent the year

- Working on the white paper: *Big Data & Artificial Intelligence (AI)*
- Working on the issue brief: *The Use of Big Data and Algorithms in Actuarial Modeling and the Impacts on Consumers*
- Identifying external data sources impacting insurance models
- Compiling research and related media on the ethics and use of algorithms and their effects on human behavior
- Presentations to groups such as the Academy Life Practice Council and the National Council of Insurance Legislators (NCOIL)

Presentation to NCOIL



The need for a Data Science and Analytic Committee resulted from the work of the Academy's Big Data Task Force which was charged to

- Understand the impact of big data and algorithms on the role of the actuary.
- Examine the framework of professional standards to provide guidance for working with these new tools.
- Work with policymakers and regulators to address issues related to their use.

The efforts of task force produced a monograph entitled, "*Big Data and the Role of the Actuary*."

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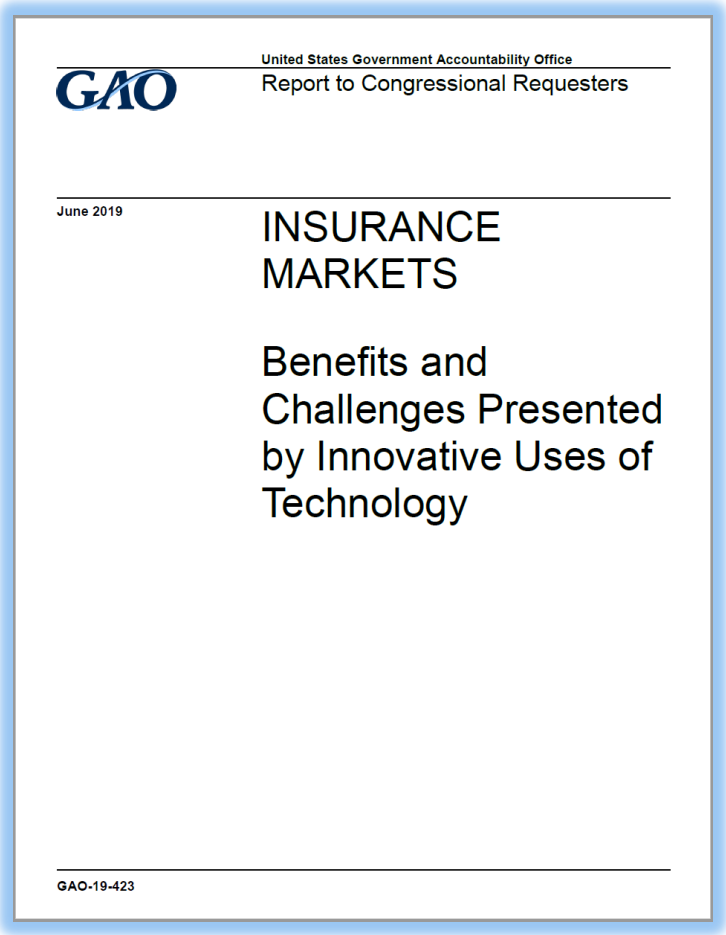
Presentation to NCOIL


United States Government Accountability Office

GAO

Report to Congressional Requesters

June 2019

INSURANCE MARKETS

Benefits and Challenges Presented by Innovative Uses of Technology

GAO-19-423

The evolution of the data scientist building insurance models present several challenges as the GAO identified:

- Models are being developed by data scientists who, unlike actuaries, may not fully understand insurance-specific requirements, such as setting premium rates that are not unfairly discriminatory, and may struggle to measure the impact of new variables used in the models.
- Data scientists may be unfamiliar with insurance rules and regulations and may not understand how to communicate their work to state insurance regulators.
- Data scientists may not adhere to a set of professional standards equivalent is scope and moral and ethical values.

Presentation to NCOIL

Purpose of the White Paper is to:

- Demonstrate the high ethical and professional standards that actuaries operate under to deliver value to insureds using objective actuarial, statistical, and AI methods.
- Discuss the changing nature of actuarial practice and the benefits of big data and predictive algorithms with a growing focus on human behavior to improve risk selection and the customer experience.
- Examine the work of insurers to control for systemic influences and socioeconomics by rigorously examining and eliminating the potential for biases to impact every step of the modeling process.
- Consider the willingness of insurers to work with regulators to resolve big data, algorithm, and AI disparate impact concerns and to promote a positive transformation of the insurance industry.

DSAC White Paper

- Goals
- Challenges
- Focal Points
- Audience
- Partners
- Roll-Out Date

Academy White Paper Title: The Use of Big Data and Algorithms in Actuarial Modeling and the Impacts on Consumers

I. Introduction

Big data and artificial intelligence (AI) are having a tremendous impact on the business model of insurance with respect to the design, marketing, regulation, and servicing of insurance products. Some impacts are minor and incremental in nature, while other impacts are transformational with major implications. While insurance serves many socially useful functions, it may not be able to address all socially desirable outcomes and remain sustainable and accessible. The following framework and key concepts lay the foundation for understanding the limits of insurance systems to balance these two objectives.

Presentation to NCOIL

The paper lays out a road map for working with regulators to resolve issues in the following areas:

- Standards for Emerging Data Sources
- Evolution of Actuarial Standards of Practice
- Ethical Issues Related to Artificial Intelligence Models
- The Reliability and Regulation of External Data Sources
- Controlling for Systemic Influences and Socioeconomics
- Regulatory Concerns Impacting the Work of the Actuary
- Impacts of Big Data to Transform the Practice of Insurance
- Behavioral Data Science Impacts on Traditional Actuarial Practice

Key Focal Points of the White Paper

Key Focal Points:

- Big data and advanced mathematical algorithms are advancing actuarial risk selection and pricing but not without risk of disparate impact to protected classes.
- The accuracy and reliability of external data is not regulated and poses risk to actuarial models by introducing nontraditional insurance variables which may be proxies for disallowed regulatory variables.
- There may be an undue heavy burden on actuarial models to cure systemic social issues when such cures are best deployed through social systemic means.
- A closer interaction among regulatory and insurance systems are needed to ensure consumer protections and promote consumer beneficial innovation.

A Focus on Ethics & Artificial Intelligence

The Ethics & AI section is focused on

- Examining issues related to transparency and privacy
- Considerations in examining data quality issues
- Issues of model risk and suitability to purpose
- Reliance on credible research to support model variables and parameters
- Establishing a consistent framework for correlation, causation, and consistency
- Identification, quantification, and model treatment of adverse proxy variables
- Develop more effective methods to explain model mechanics and results
- Examining issues related to diversity in model development and review

The Reliability and Regulation of External Data Sources

The Challenges:

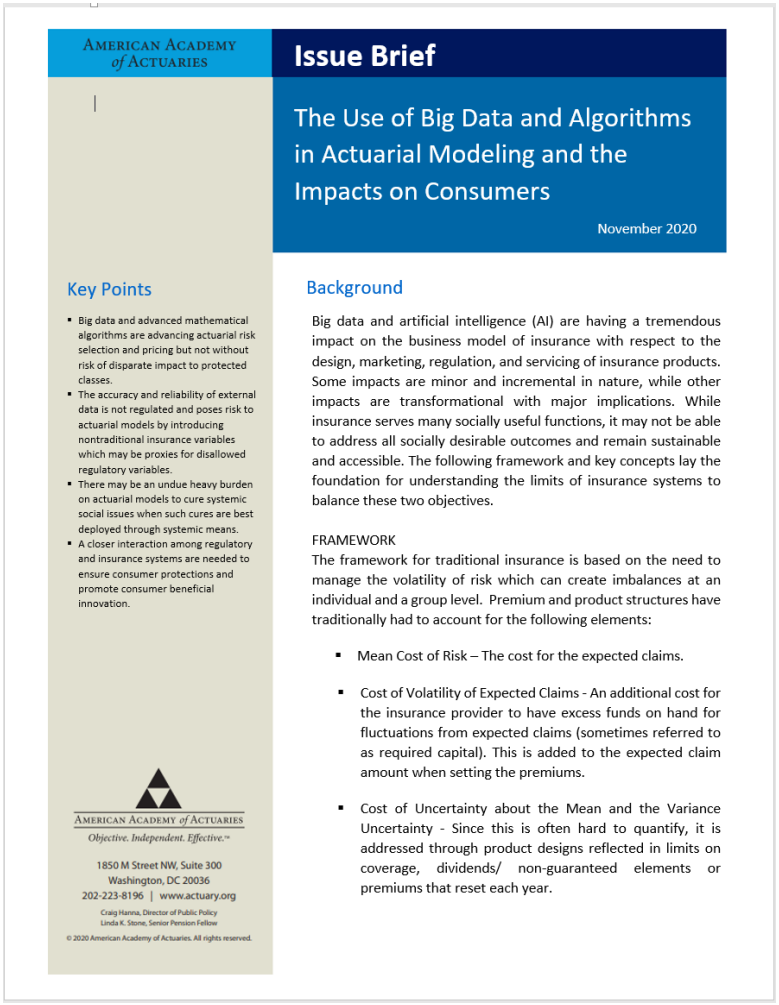
- New data sources continue to emerge
- There is no regulatory policing of third-party data sources
- Companies may not sufficiently audit or validate external data sources for appropriateness, relevancy, trustworthiness, and freshness for the risk classification or pricing exercise
- External data may be ill-defined for the purpose companies are using it
- External data may have been designed using regulatory disallowed variables
- Companies may not be able to explain how it was collected and processed or demonstrate it poses no harm or disparate impact to consumers

Presentation to NCOIL

Actuaries have a role in ensuring consumer data is protected and algorithms are:

- Appropriately Transparent
- Explainable and Interpretable
- Free of unfairly discriminatory variables & related proxies
- Based on variables with an appropriate relationship to the risk being insured
- Reflect appropriate granularity to guard against unintended disparate impacts to protected classes
- Attended to with human oversight to ensure controls and metrics are in place to monitor the continued fit and appropriateness of models for the purpose they were designed
- Validated for quality and reliability by actuaries or experts who understand insurance company target markets, product lines, and insurance liabilities

DSAC Issue Brief



American Academy of Actuaries

Issue Brief

The Use of Big Data and Algorithms in Actuarial Modeling and the Impacts on Consumers

November 2020

Key Points

- Big data and advanced mathematical algorithms are advancing actuarial risk selection and pricing but not without risk of disparate impact to protected classes.
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- A closer interaction among regulatory and insurance systems are needed to ensure consumer protections and promote consumer beneficial innovation.

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

Craig Hanna, Director of Public Policy
Linda K. Stone, Senior Pension Fellow

Background

Big data and artificial intelligence (AI) are having a tremendous impact on the business model of insurance with respect to the design, marketing, regulation, and servicing of insurance products. Some impacts are minor and incremental in nature, while other impacts are transformational with major implications. While insurance serves many socially useful functions, it may not be able to address all socially desirable outcomes and remain sustainable and accessible. The following framework and key concepts lay the foundation for understanding the limits of insurance systems to balance these two objectives.

FRAMEWORK

The framework for traditional insurance is based on the need to manage the volatility of risk which can create imbalances at an individual and a group level. Premium and product structures have traditionally had to account for the following elements:

- Mean Cost of Risk – The cost for the expected claims.
- Cost of Volatility of Expected Claims - An additional cost for the insurance provider to have excess funds on hand for fluctuations from expected claims (sometimes referred to as required capital). This is added to the expected claim amount when setting the premiums.
- Cost of Uncertainty about the Mean and the Variance Uncertainty - Since this is often hard to quantify, it is addressed through product designs reflected in limits on coverage, dividends/ non-guaranteed elements or premiums that reset each year.

- The “Mini-Me” version of the White Paper.
- It is a road map of issues for regulatory engagement.
- Questions in key topic areas have been posed
  - Coverage of ASOPs wrt emerging AI issues
  - External data, reliance, validation, and certification
  - The role of insurance to mitigate systemic influences.
  - Positive transformation of insurance wrt mutual interests
- A few sections are still being worked on, but each section is limited to 500 words +/- a few.
- Aiming to have it ready for independent review by yearend and Academy review, January 2021.

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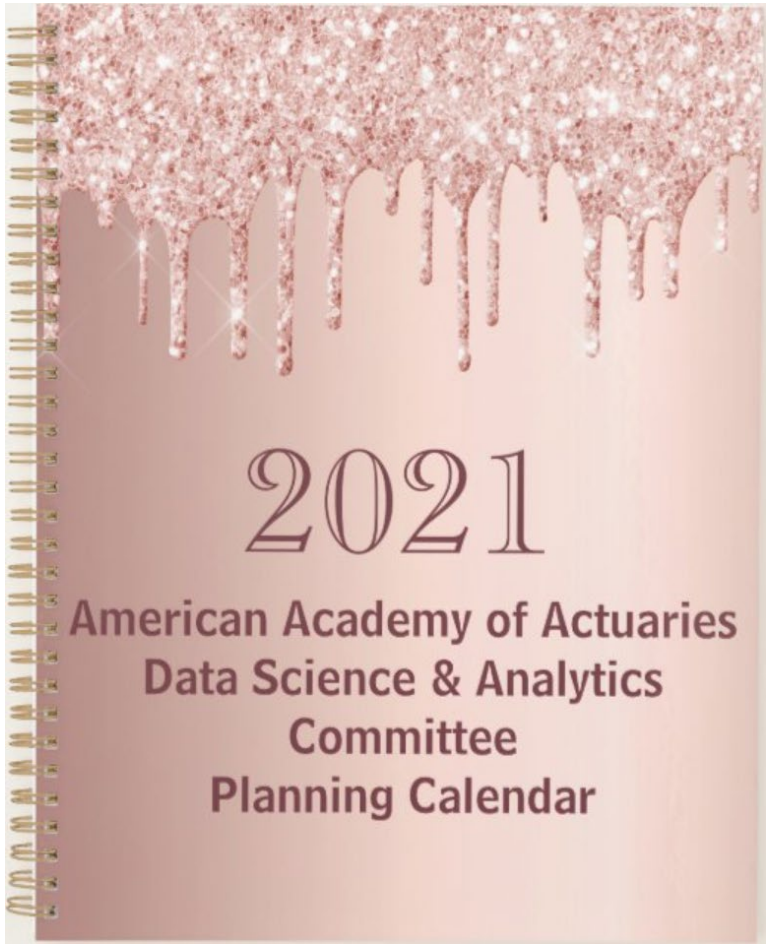
Presentation to NCOIL

Assembly Ken Cooley made a point of asking the actuaries for their thoughts. Roosevelt Mosely, Mary Bahna-Nolan, and Dorothy L. Andrews offered comments.

Plans for 2021



- Engage regulators on issue brief
- Present the white paper in an Academy webinar.
- Ideas for additional papers:
  - Evaluating data and algorithms for quality as an extension of Modeling Actuarial Standard of Practice (ASOP) No. 56 and ASOP No. 12.
  - How to identify data biases, discriminatory proxy variables, unintentional biases and implications for disparate impacts on consumers.
  - Review, compile, and summarize Academy resources on big data and possibly set up a repository of references on the website.
  - Examine ways big data can be used to create social impact for those of lower socioeconomic status.
  - …

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INSURANCE COMPANY USE OF RATING FACTORS AND THE IMPLICATIONS FOR PROTECTED CLASSIFICATIONS

ROOSEVELT C. MOSLEY, JR., MAAA, FCAS, CSPA, MAAA
Member, Data Science and Analytics Committee (DSAC)
Member, CPC Racial Equity Task Force

February 23, 2021

Use of Rating Factors

- Insurance company use of rating factors
  - Usage based insurance
- Rating factor prohibitions

Insurance Company Use of Rating Factors

- Insurance companies use rating factors to determine the right rate for the risk with different characteristics and different expected losses
  - Protect financial soundness
  - Enhanced fairness
  - Economic incentive

Historical Use of Rating Factors

- Automobile insurance
  - Territory
  - Driver age
  - Vehicle symbol
  - Model year/age of vehicle
  - Prior claims
- Homeowners insurance
  - Amount of insurance
  - Territory
  - Fire protection class
  - Protective devices

Examples of More Sophisticated Rating

Auto

- Prior insurance limits
- Number of operators
- Payment variables
- Accident & violation rating
- Territories
- Presence of a lien
- Lease
- Advance quote discount
- Homeowner
- Mileage
- Vehicle segmentation
- New/used
- Pay in full
- Lapse/cancelation
- UBI
- Credit

Homeowners

- Contents percent of coverage A
- Deductible
- Pay in full
- Lapse/cancelation
- Late payments
- Presence of endorsements
- New home buyer
- Advance quote
- Occupant (age, marital status)
- Presence of children
- Number of mortgages
- By-peril rating
- Credit
- Property Characteristics

The Use of Rating Factors

- How companies justify the use of rating factors
  - Company loss experience analysis (univariate, multivariate)
  - Competitor rate filings
  - External data sources
- Why do some companies choose not to use certain rating factors
  - Loss experience does not justify it
  - Operational issues
  - Internal company decision
  - Business considerations

Rating Factor Restrictions

- Prohibition
  - Gender (Michigan, California, Pennsylvania)
  - Credit score (Massachusetts, California, Hawaii)
  - Not at fault accidents
- Restricted usage
  - Territory (New Jersey, California)
  - Credit (Maryland, Washington)
  - Education and occupation (New York)
- Prescriptive
  - California Proposition 103
  - North Carolina

What Does This Mean for Insurance Pricing?

Potential Solutions That Have Been Proposed

1. Do nothing
2. Exclude risk characteristics from rating plans
3. Control for protected characteristics in pricing
4. Adjust final pricing outcomes for protected classes

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LAUREN CAVANAUGH, MAAA, FCAS
Vice President, Casualty

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Academy P/C Initiatives on Racial Equity

- Presented at the National Council of Insurance Legislators (NCOIL) and NAIC Special Committees meetings
- Identified Actuarial Standards of Practice and Discussed Data Considerations
- Established a P/C Racial Equity Task Force

Actuarial Standards of Practice (ASOPs)

- ASOP No. 12, *Risk Classification*
  - Provides perspective of concept of ‘fairness’ in insurance rates
  - Rates within a risk classification system would only be considered equitable (or fair) if differences in rates reflect material differences in expected cost for risk characteristics.
  - This is demonstrated if it can be shown that the experience ***correlates*** to the risk characteristic.

ASOPs (continued)

- ASOP No. 23, *Data Quality*
- ASOP No. 53, *Estimating Future Costs for Prospective P/C Risk Transfer and Risk Retention*
- ASOP No. 56, *Modeling*
- Other ASOPs
- *Code of Professional Conduct*

Data

- Growing volume of data available, both external and internal
- ASOP No. 23 - An actuary should review data for reasonableness and consistency, unless, in the actuary's professional judgment, such review is not necessary or practical.

Data

- Potential Safeguard – Certification of Data
  - Independent third-party organization
  - Hidden racial biases could be reviewed and commented on
  - Accuracy and relevancy of data could be reviewed and commented on
- Disparate Impact Analysis

Public Policy Considerations

- NAIC and NCOIL
- Credit Scores
- Federal Insurance Office/U.S. Dept. of the Treasury
- Disparate Impact
- Other

Thank You

Questions?

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Contacts:

- Rich Gibson - Senior Casualty Fellow (Gibson@actuary.org)
- Devin Boerm – Deputy Director (Boerm@actuary.org)