BIG DATA & INSURANCE

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What is Big Data?

- No official or agreed upon definition
- Most variations center on consistent themes
 - Large amounts of data/information
 - Analysis, storage, and management of the data presents logistical challenges
- Some also focus on the potential impact on society
 - Ability to use data in new ways to spark new insights and/or deliver value
 - Intersection of business and consumer experience



Why is Big Data Important?

- Big data is everywhere...
 - Start-ups/tech companies
 - Retail
 - Financial institutions
- ...and includes lots of types of information from many sources public and private
 - Social media
 - Unstructured data (video, text, voice)
 - Geospatial/location information
 - Telematics
- It's changing the way we work, the way we buy/sell goods and services
- There is great potential for value, but also some risks





Big Data Applications in Insurance

- Insurers have always been in the data business, but big data is changing the way insurers use data
 - Access to more and different types/sources of information
 - More powerful tools to analyze data
 - New and more sophisticated applications
- How are insurers using it?
 - Marketing
 - Underwriting
 - Pricing
 - Claims
- Why are insurers using it? A few examples...
 - Product design and refinement
 - Risk management
 - Fraud detection
 - Competitive advantage



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Big Data through the Regulatory Lens

- Evolution of the "asymmetric information" problem that leads to need for regulation
- Protect the public while supporting beneficial innovation
 - Identify opportunities for development that benefit consumers and enhance market competitiveness and stability
 - Understand and mitigate potential risks and unintended consequences of big data, as well as those related to our regulatory framework
- Understand what data is being used, for what purpose, and to what effect
- Evaluate whether current regulatory tools are sufficient to protect public and support innovation
- Identify how we can harness and analyze data to do our jobs more effectively and efficiently

NAIC's Big Data (D) Working Group

- Newly formed in 2016 to address insurers' and regulators' use of big data across all lines of insurance
- Charge:
 - Explore insurers' use of big data for claims, marketing, underwriting and pricing. Explore potential opportunities for regulatory use of big data to improve efficiency and effectiveness of market regulation. If appropriate, make recommendations no later than the 2016 Fall National Meeting for 2017 charges for the Committee to address any recommendations identified by the 2016 exploration.
- To date, approach focused on information gathering, discussion of potential benefits and areas of concern

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What the Big Data (D) WG is Discussing

- Sources of data
- Transparency to regulators, consumers
- Accuracy of information and opportunities to correct
- Complexity and consumer ability to understand and react
- Consumer experience enhancements
- Risk segmentation
- Risk management
- Objectivity vs. bias in models and datasets
- Dynamic models and machine learning
- Privacy and information security
- Fraud identification
- Regulatory use of existing data



Big Data (D) WG's Next Steps

- Currently working on recommended charges to present at the NAIC's Fall National Meeting in December
- Likely to address:
 - Regulatory resources to evaluate insurers' use of big data and complex models
 - Policy discussions about big data applications and relevance of current regulatory framework
 - Regulators' use of big data
- A significant amount of work ahead!



QUESTIONS? COMMENTS?



Big Data and Actuarial Professionalism



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Disclaimer

Please note: The panelists' statements and opinions are their own and do not necessarily represent the official statements or opinions of any boards or committees of the American Academy of Actuaries, or any other actuarial organization, nor do they express the opinions of their employers.





The Big Picture



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21st Century Technology





What is Big Data?

- No widely accepted definition
- 5 Vs:
 - Variety
 - Value
 - Veracity
 - Volume
 - Velocity
- Predictive Analytics
- Computational Algorithms
- Data Handling





Role of the Actuary

- Multidisciplinary Team
- Statistician, Computer Expert, Actuary
- Subject Matter Expert
- Hypothesis Generator
- Turn Big Data into Smart Data





State of Big Data – Property/Casualty

- Used by 50% of companies
 - Primarily for pricing, underwriting, and risk selection
- Handles interdependence with greater sophistication
- Reduces antiselection

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Examples – Property/Casualty

- 1. Pricing, especially personal lines
- 2. Underwriting
- 3. Claims management
- 4. Quoting
- 5. Fraud detection/prevention
- 6. Premium audit
- 7. Agent selection/retention



State of Big Data – Health

- Traditional Sources Claims and Eligibility
- "Big Data"
 - Electronic Medical Records
 - Lab results
 - Medications
 - Other clinical detail
 - Consumer data
 - Purchasing history
 - Lifestyle (TV, diet, activity, etc.)



Examples – Health

- **Clinical interventions** How to identify lifestyle issues affecting service utilization
- **Risk score coding** Find people who have conditions, but who haven't received services for that condition





State of Big Data – Life/Annuity

- Big Data
 - Not a new topic
 - Direct Marketing 1980s
 - Analysis of data
- Predictive Analytics
 - Recent Developments
 - Predict Behavior



Examples – Life/Annuity

- Direct Marketing Measure and predict "lift" in response rates
- Variable Annuities Policyholder Behavior
- Life Insurance
 - Underwriting
 - Retention
 - Agency Selection
 - In Force Management
 - Fraud Detection





Identifying Professionalism Challenges and Resources in Connection with the Use of Big Data



The Code of Professional Conduct

- "With great power comes great responsibility" Spider Man, 2002, Uncle Ben to Peter Parker Professional Integrity PRECEPT 1. An Actuary shall act honestly, with integrity and competence, and in a manner to fulfill the profession's responsibility to the public and to uphold the reputation of the actuarial profession.
- •Annotation 1-2. An Actuary shall not provide Actuarial Services for any Principal if the Actuary has reason to believe that such services may be used to violate or evade the Law or in a manner that would be detrimental to the reputation of the actuarial profession.
- •Annotation 1-4. An Actuary shall not engage in any professional conduct involving dishonesty, fraud, deceit, or misrepresentation or commit any act that reflects adversely on the actuarial profession.





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Some Legal Reference Points

- Applicable law include, but not limited to:
 - State insurance laws and regulations
 - The Unfair Claims Practices Act and Unfair Trade Practices Act
 - The Fair Credit Reporting Act
 - Gramm-Leach-Bliley privacy laws





Understanding Some Ethical Guidelines

- Questions to consider
 - 1) Does your approach comply with applicable law both letter of the law and in spirit?
 - 2) Are certain permissions needed?
 - 3) Are you comfortable describing what you are doing to stakeholders (consumers, insurance companies, providers, DOI, auditors, etc.)?



Examples of ASOPs that might apply to Big Data follow. This list of ASOPs is not exhaustive. Ultimately, it is the actuary's responsibility to identify the standard(s) that apply to each assignment.



- ASOP No. 23: Data Quality
 - <u>Section 4.1.g</u>: Disclose "(1) the existence of results that are highly uncertain or have a potentially material bias of which the actuary is aware due to the quality of the data; and (2) the nature and potential magnitude of such uncertainty or bias, if they can be reasonably determined;"



- ASOP No. 12: Risk Classification
 - <u>Section 3.2.1</u>: "The actuary should select risk characteristics that are related to expected outcomes."
 - <u>Section 3.3.3</u>: "When establishing risk classes, the actuary should (a) comply with applicable law; (b) consider industry practices for that type of financial or personal security system as known to the actuary; and (c) consider limitations created by business practices of the financial or personal security system as known to the actuary."
- Risk Classification Monograph <u>http://dev.actuary.org/files/publications/RCWG_RiskMonograph_</u> <u>Nov2011.pdf</u>
 Annual Meeting and Public Policy Forum

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- ASOP No. 38: Using Models Outside the Actuary's Area of Expertise (P&C)
 - Section 3.3.1: The actuary should be reasonably familiar with the basic components of the model and have a basic understanding of how such components interrelate within the model. In addition, the actuary should identify which fields of expertise were used in developing or updating the model and should make a reasonable effort to determine if the model is based on generally accepted practices within the applicable fields of expertise. The actuary should also be reasonably familiar with how the model was tested or validated and the level of independent expert review and testing.



- Third Exposure Draft on Modeling
 - Released July 2016
 - Comments were due by October 31, 2016
 - Applies to <u>all</u> practice areas





- ASOP No. 25: Credibility Procedures
 - <u>Section 3.5</u>: "In carrying out credibility procedures, the actuary should consider the homogeneity of both the subject experience and the relevant experience. Within each set of experience, there may be segments that are not representative of the experience set as a whole. The predictive value can sometimes be enhanced by separate treatment of these segments. The actuary should also consider the balance between the homogeneity of the data and the size of the data set."



- ASOP No. 41: Actuarial Communications
 - <u>Section 3.2</u>: 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.
 - <u>Section 3.4.4</u>: An actuarial communication should identify the party responsible for each material assumption and method. Where the communication is silent about such responsibility, the actuary who issued the communication will be assumed to have taken responsibility for that assumption or method. The actuary's obligation when identifying the other party who selected the assumption or method depends upon how the assumption or method was selected.





- Annotation 2-2 of the *Code of Professional Conduct*
 - "The absence of applicable qualification standards for a particular type of assignment...does not relieve the Actuary of the responsibility to perform Actuarial Services only when qualified to do so..."



• Precept 2 of the *Code of Professional Conduct* states:

"An Actuary shall perform Actuarial Services only when the Actuary is qualified to do so on the basis of basic and continuing education and experience, and only when the Actuary satisfies applicable **qualification standards**." (emphasis added)

- The USQS applies to members of all five U.S.-based actuarial organizations (Academy, ASPPA/ACOPA, CAS, CCA, and SOA).
- The USQS sets forth qualification requirements for actuaries practicing in the U.S.





- Qualification requires:
 - A minimum level of technical skill.
 - Practical real-world experience.
 - Familiarity with all the laws, regulations, and standards of practice that apply.
 - Keeping up with new techniques, rules, and market developments.





- <u>USQS Section 4.3</u>: Emerging or Non-Traditional Areas of Actuarial Practice
- "An actuary practicing in an emerging or non-traditional practice area can satisfy the continuing education requirements by maintaining knowledge of applicable standards of practice, actuarial concepts, and techniques relevant to the topic of the Statement of Actuarial Opinion."



Look in the Mirror Test

Objectively examine your professional qualifications (basic and continuing education and experience) and make a reasoned judgement about whether you can fulfill your obligations under the Code.





Support from the ABCD

• Role of the:

Actuarial Board for <u>Counseling</u> and Discipline



Role of Professional Judgment

- Questions to consider
 - 1) How representative is your data set?
 - 2) Does your model account for biases?
 - 3) How accurate are your predictions based on big data?
 - 4) Does your reliance on Big Data raise fairness or ethical concerns?

Source: Big Data: A Tool for Inclusion or Exclusion, FTC, January 2016 Annual Meeting and Public Policy Forum

- The Role of Professional Judgment
 - <u>Correlation</u> is not <u>Causality</u>





Spurious Correlation



- The Role of Professional Judgment
 - <u>Correlation</u> is not <u>Causality</u>
 - Big Data can be misleading
 - Context
 - Overreliance
 - Cherry-picking
 - Value of being able to connect the dots











Be a thermostat!!



Questions?

Thank you.



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