

# Predictive Modeling Applications in Actuarial Science

Co Editors

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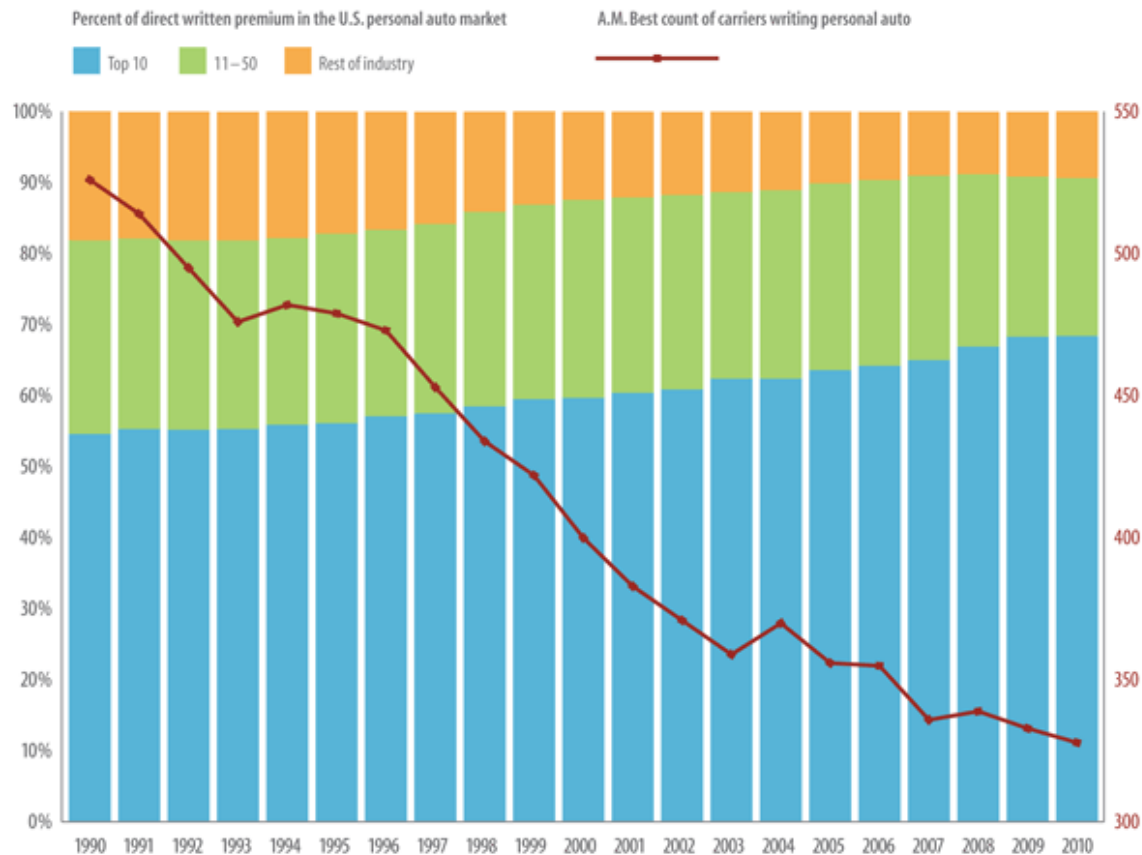
Richard Derrig

# Why the New Emphasis on Predictive Modeling?

- Actuaries have been doing it for years
  - “Insurance Rates with Minimum Bias”
    - By Robert A. Bailey – *PCAS* 1963
  - “A Systematic Relationship Between Minimum Bias and Generalized Linear Models”
    - By Stephen J. Mildenhall – *PCAS* 1999

# Why the New Emphasis on Predictive Modeling?

- Insurers who invest in predictive modeling are gaining market share.



Source - Marty Ellingsworth – President of ISO Innovative Analytics

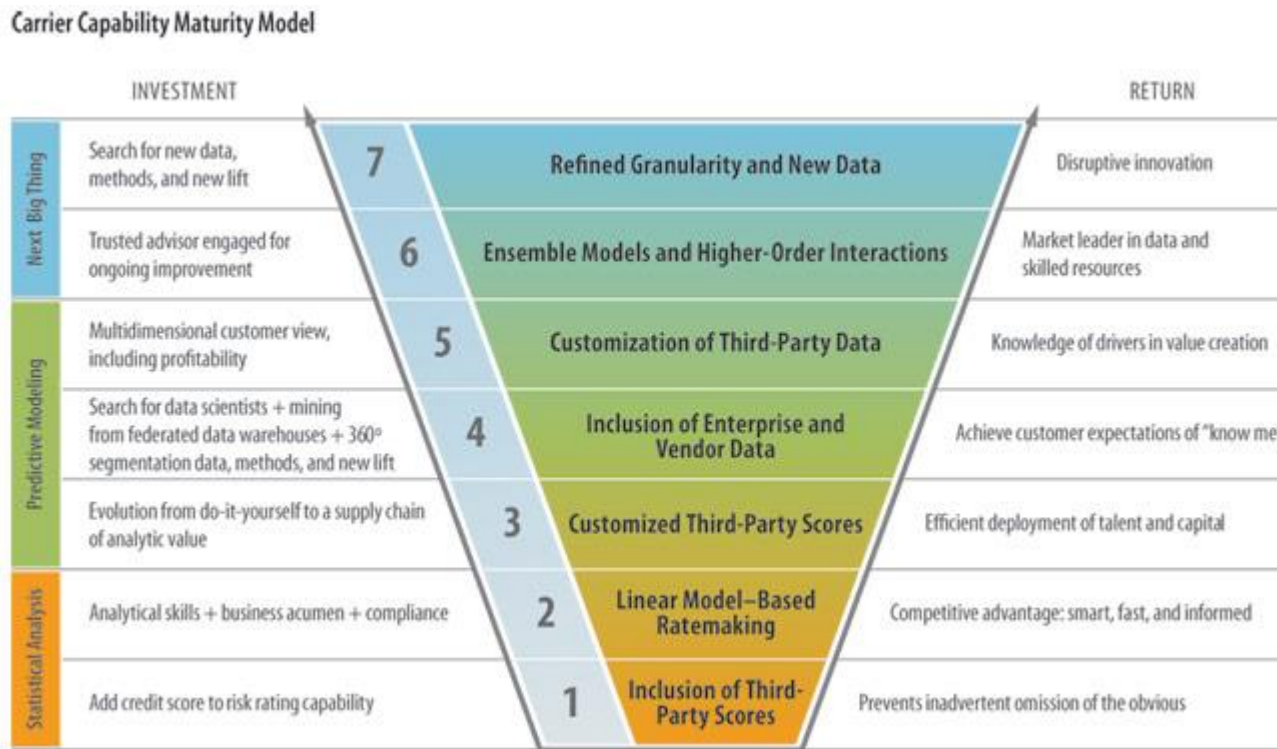
# Current Predictive Modeling Environment

## Here at the CAS RPM Seminar

- Workshops
  - Predictive Modeling - Quickly sold out
  - Introduction to R
- Roundtable Discussions (A sample)
  - Usage Based Auto Ins (2)
  - Validating a Predictive Model
  - Predictive Modeling Beyond Ratemaking
- Sessions
  - Group of 12 sessions under “Predictive Modeling”

# What is Involved in Predictive Modeling?

- More than learning how to run a GLM.



# The Idea Behind the Book

- Volume 1 – Foundations
  - Nearing completion.
  - Authors are mainly academic experts in the field of various aspects of predictive modeling.
- Volume 2 – Applications
  - Several chapter proposals have already been accepted.
  - Will consider additional proposals until April 15.

# Volume 1 – Foundations

## **Table of Contents**

- 1. Introduction to Predictive Modeling in Actuarial Science

## **Fundamentals of Cross-Sectional Regression Modeling**

- 2. Multiple Linear Regression
- 3. Regression with Categorical Dependent Variables
- 4. Regression with Count Dependent Variables
- 5. Generalized Linear Models
- 6. Frequency/Severity Models

## **Extended Cross-Sectional Regression Modeling**

- 7. Mixed Models
- 8. Generalized Additive Models, including Non-Parametric Regression
- 9. Fat-Tail Regression Models
- 10. Spatial Statistics
- 11. Supervised versus Unsupervised Learning
- 12. Bootstrapping, including Simulation

## **Bayesian Modeling**

- 13. Introduction to Bayesian Computational Methods
- 14. Bayesian Regression Models

## **Longitudinal Modeling**

- 15. Time Series, including Lee-Carter forecasting
- 16. Longitudinal and Panel Data Models
- 17. Credibility and Regression Modeling
- 18. Survival Models, including Cox Regression
- 19. Claims Triangles/Loss Reserves
- 20. Transition Modeling

# Selected Chapters

- Fat Tailed Regression Models – Peng Shi
- Unsupervised Learning – Louise Francis
- Transition Modeling – Bruce Jones



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