

Actuarial

2000-2011 SOA LTC Intercompany Experience Study

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ILTCI

15th Annual Intercompany Long Term Care Insurance Conference

- Introductions
- Goals & Project Plan
- Data gathering
- Assessment of Data
- Morbidity experience
- Experience table: Model build

Multi-faceted team

- Society of Actuaries (sponsor)
- Steering Committee
- Towers Watson
- LIMRA
- MIB

- Goals of this study:
 - Obtain, review and model morbidity experience for long term care insurance
 - Use the most complete data
 - Provide aggregate databases to the industry
 - Build experience table

- Data gathering (Steering Committee)
 - Data request sent to top carriers in US
 - Conversations with carriers
 - Policy history file
 - Claim file
 - 22 companies submitted full or partial data
 - Exposure period: 2000-2011
- Data scrubbing (MIB & LIMRA)
 - Valid data fields

- Data Assessment (Towers Watson)
 - Created summaries
 - Policy history
 - Policyholder characteristics
 - Benefit characteristics
 - Confirmatory calls with participants
 - Identified key data items & find companies with sufficient data quality to analyze

- For each morbidity component
 - Identified key data fields (approximately 12 characteristics)
 - Participants with sufficient quality and complete data were selected
 - Analyzed variety of remaining data to ensure good mixture of policyholder and benefit characteristics
- Maximizing data while minimizing unknowns

- Reviewed each key morbidity experience metric
 - Incidence
 - Claim termination
 - Claim utilization
- Reviewed for reasonableness & trends
- Consistent definition of unique claim:
 - Payment made and
 - Multiple claims for single policyholder combined if service dates are within 6 months

- Incidence
 - Active & total life incidence
 - Reviewed
 - Rates in aggregate
 - Rates by age, gender, marital status, etc
 - Analyzed results by company and characteristics
- Total exposure: 15 million life years
- Claim count: over 200k

- Claim terminations
 - Total terminations & disabled mortality
 - 4 million years of disabled exposure
 - Claim counts: 200k
- Claim utilization
 - GPO and unknown benefit inflation excluded as benefit schedules were not provided
 - Resulting database has over \$7 billion of claims paid

- Aggregate databases
 - Separate tables for each morbidity component
 - Publicly available pivot tables that allow user to manipulate data and analyze results at granular level
 - Ability to view results more dynamically than static tables
 - Confidentiality of data from participants
 - No manipulation to scale data

- Goal: Develop experience table based on aggregated databases for:
 - Incidence, claim termination, utilization
- Mixture of
 - **Predictive modeling:** Generalized linear modeling (GLM) used to determine baseline rate and factors
 - **Business knowledge:** used to verify causal relationships; feedback cycle with committee

- Predictive modeling background:
 - Is the process of developing a model that estimates the outcome of a given process
 - Uses statistical tests to determine the factors, and which combinations of factors, impact the process
 - Separates signal from noise in actual experience
- Predictive models are used to make projections of future results

- GLM uses statistical methods to analyze data and determine relationships
- Key metrics utilized include:
 - Chi-square:
 - AIC (Akaike Information Criterion)
 - BIC (Bayesian Information Criterion)

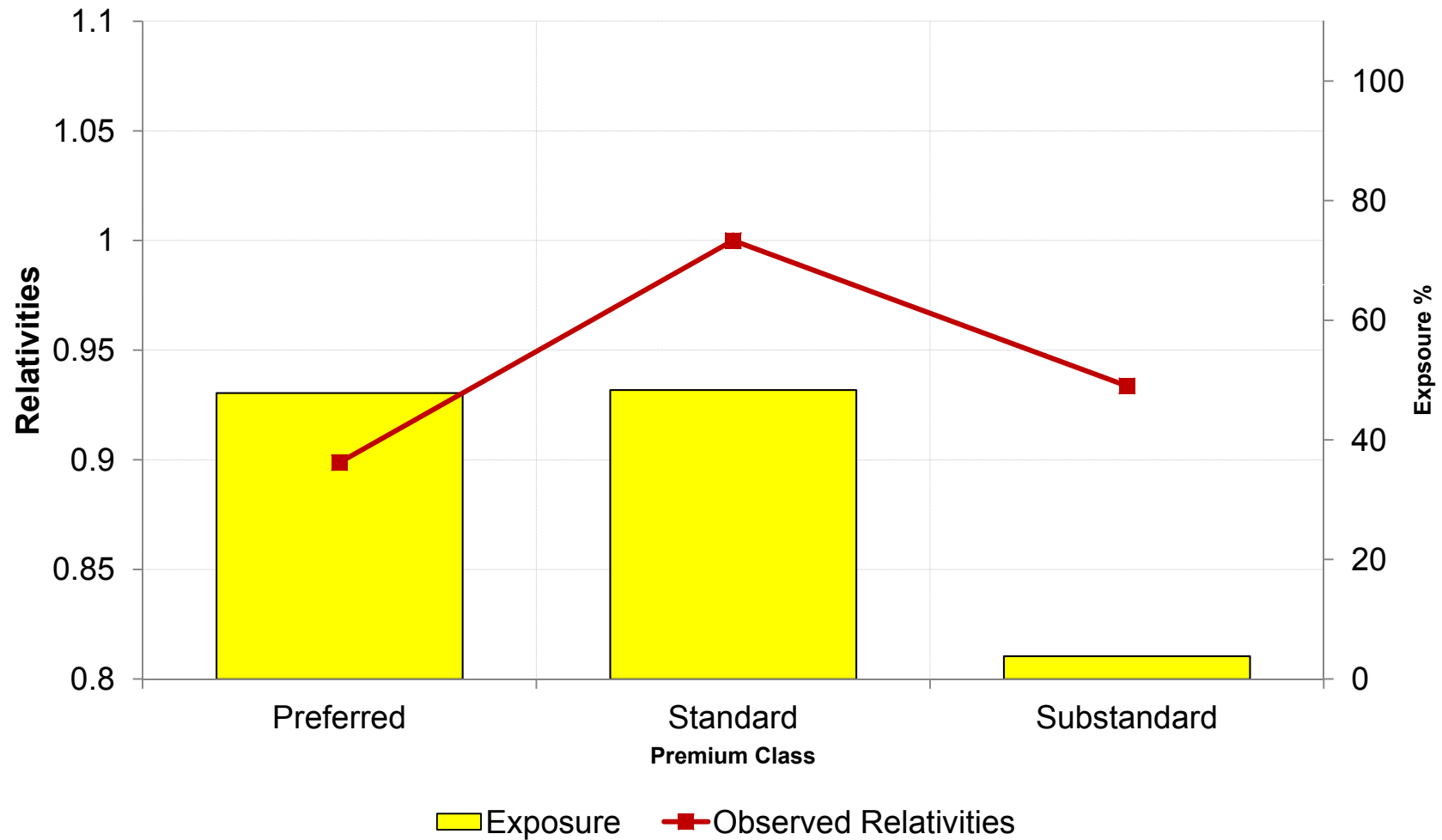
- Claim incidence model:
 - Data driven
 - Multiplicative models
 - Total lives
 - Active lives
 - Base factor & vectors based on cell selection determine model output

- Claim incidence model predictors:
 - Incurred age
 - Elimination period
 - Benefit period
 - Policy duration
 - Martial status
 - Underwriting type
 - Underwriting class
 - Daily benefit
 - Region
 - Tax Qualified status
 - Coverage
 - Gender

Experience Table



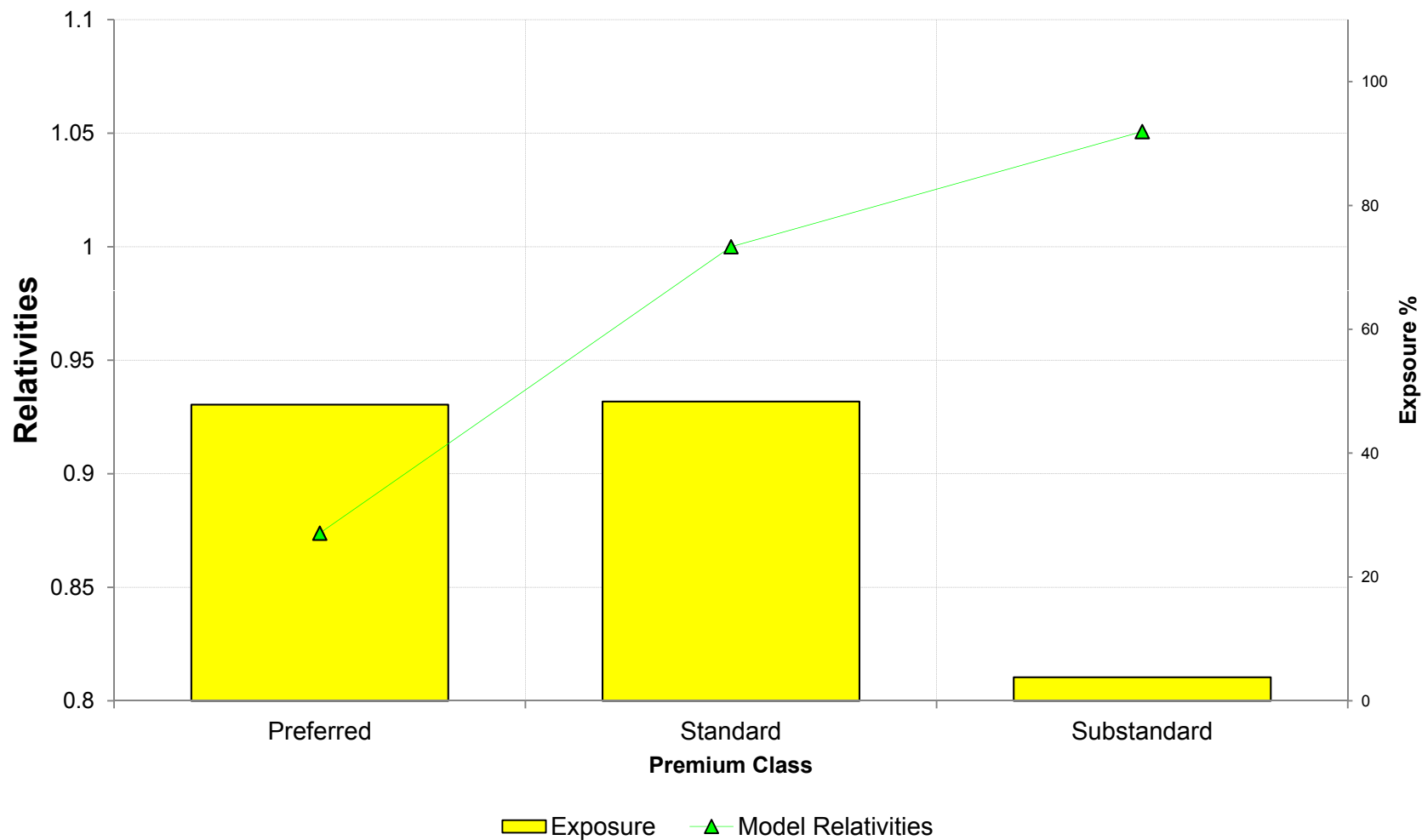
Premium Class Relativities



Experience Table



Premium Class Relativities

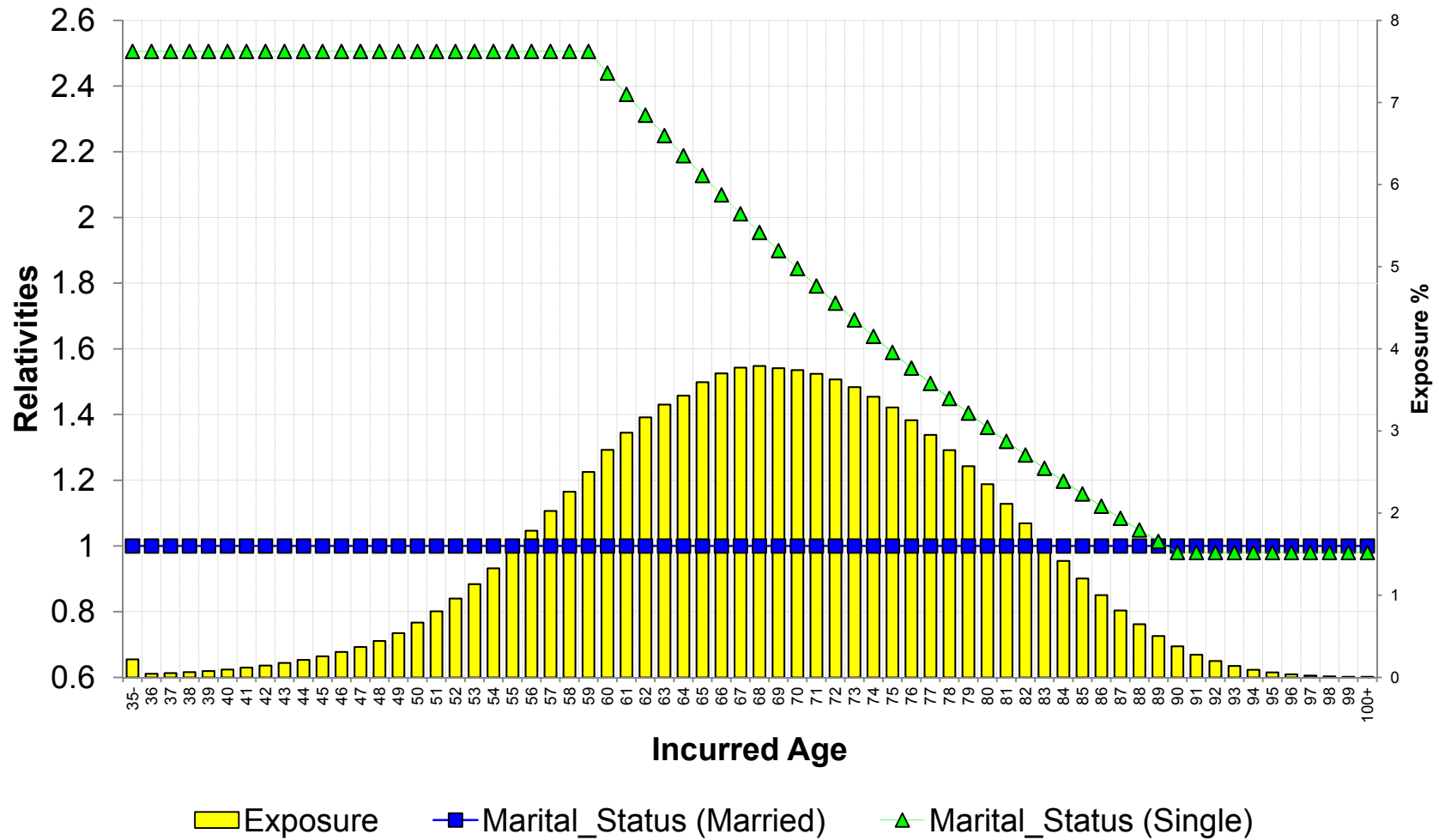


- Claim incidence model interactions:
 - Gender by incurred age
 - Tax qualified by policy duration
 - Coverage by incurred age
 - Region by daily benefit
 - Underwriting class by policy duration
 - Underwriting type by policy duration
 - Marital status by incurred age

Experience Table



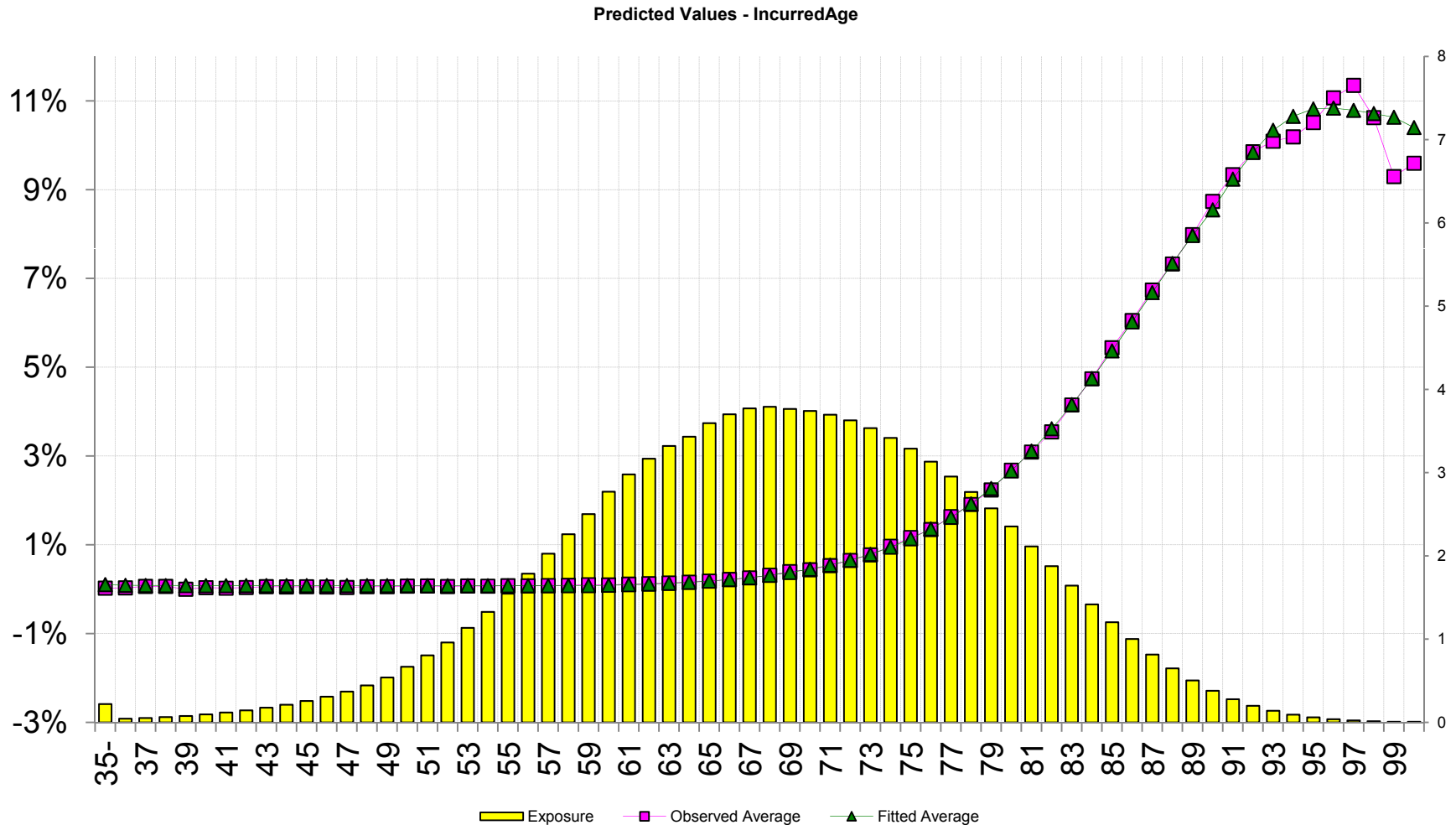
Incurred Age interacted with Marital Status



Experience Table



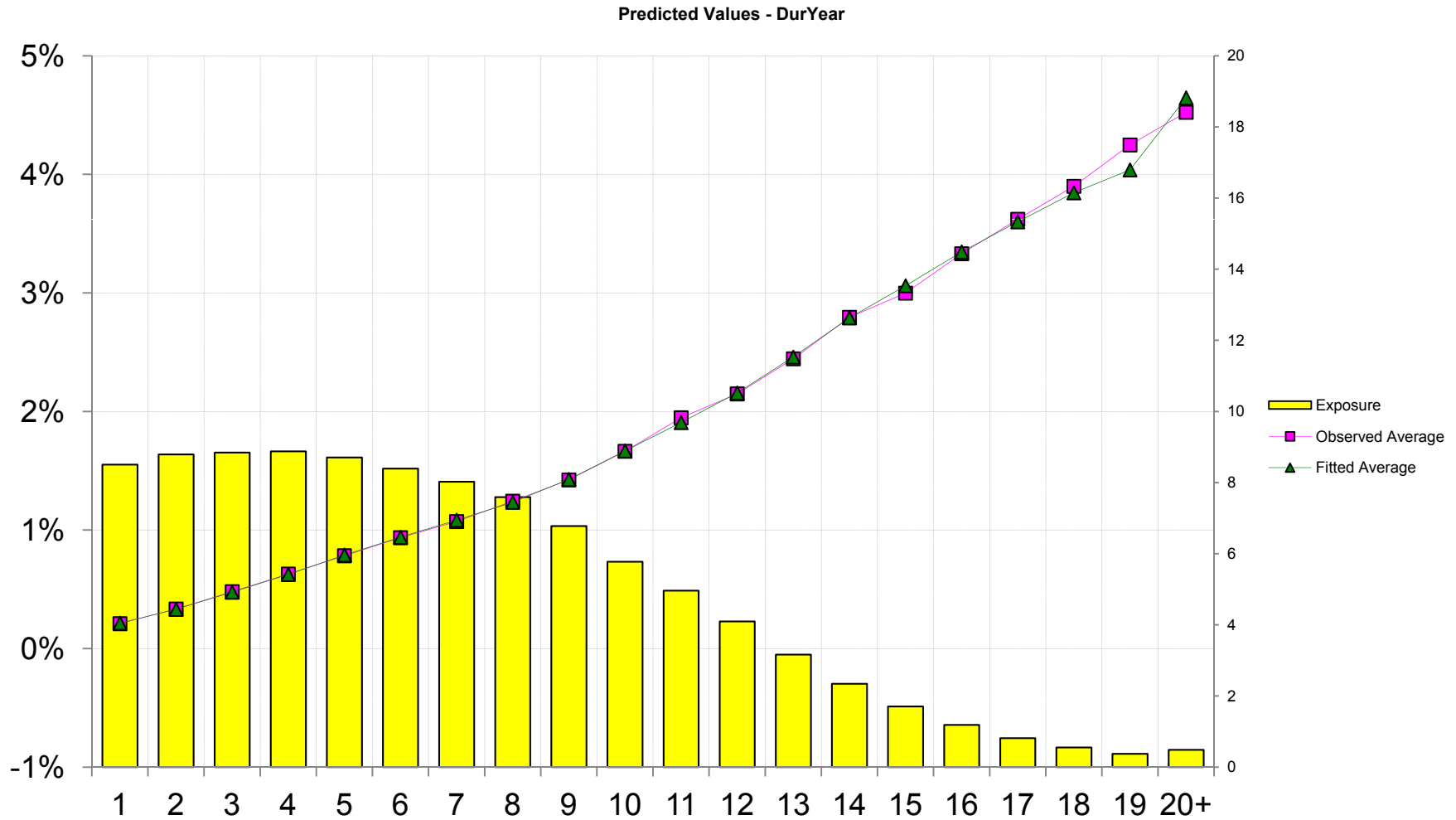
Example of model fit: by attained age



Experience Table



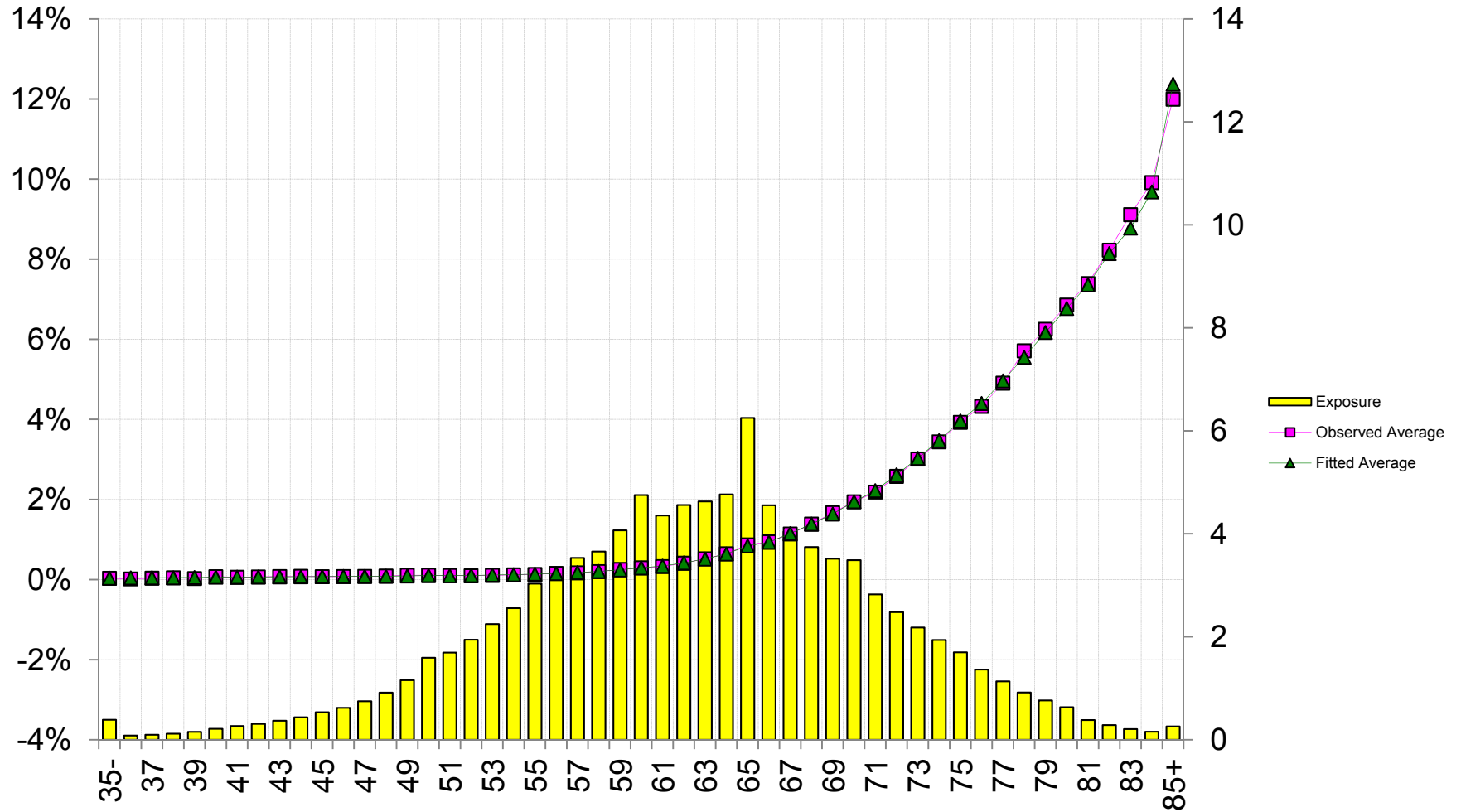
Example of model fit: by policy duration



Experience Table



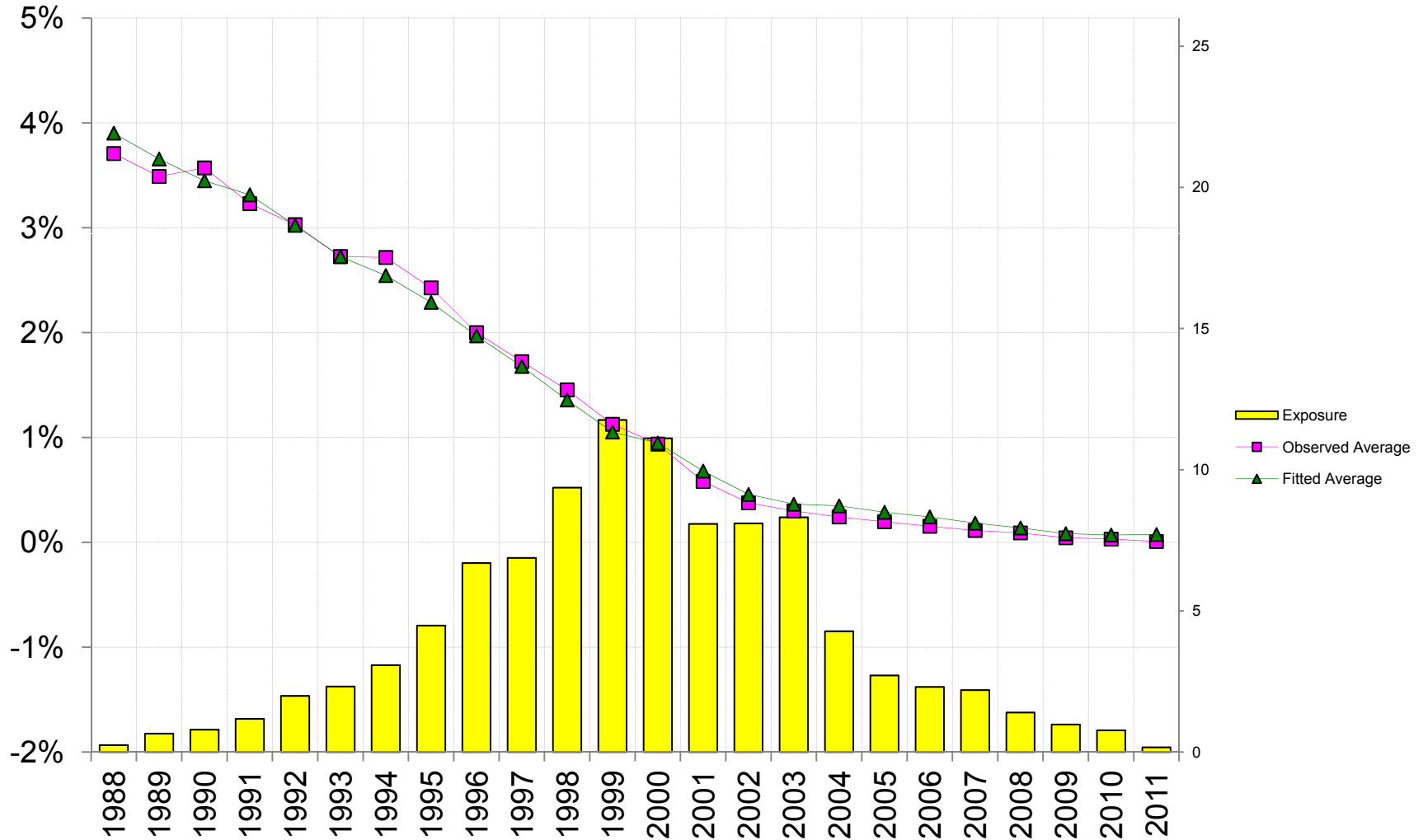
Example of model fit: by issue age



Experience Table



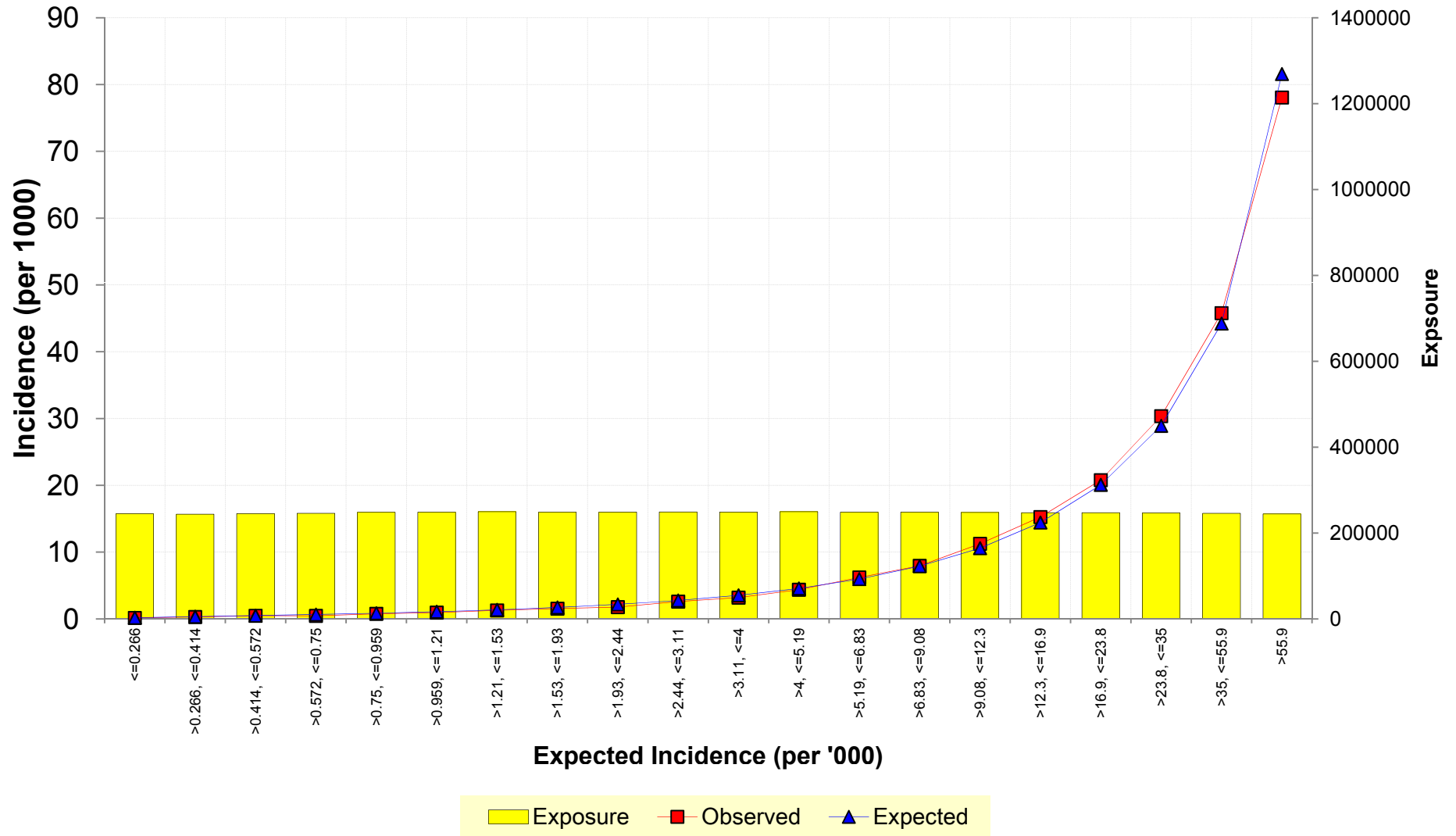
Example of model fit: by issue year



Experience Table



Actual vs Expected Incidence on hold-out sample



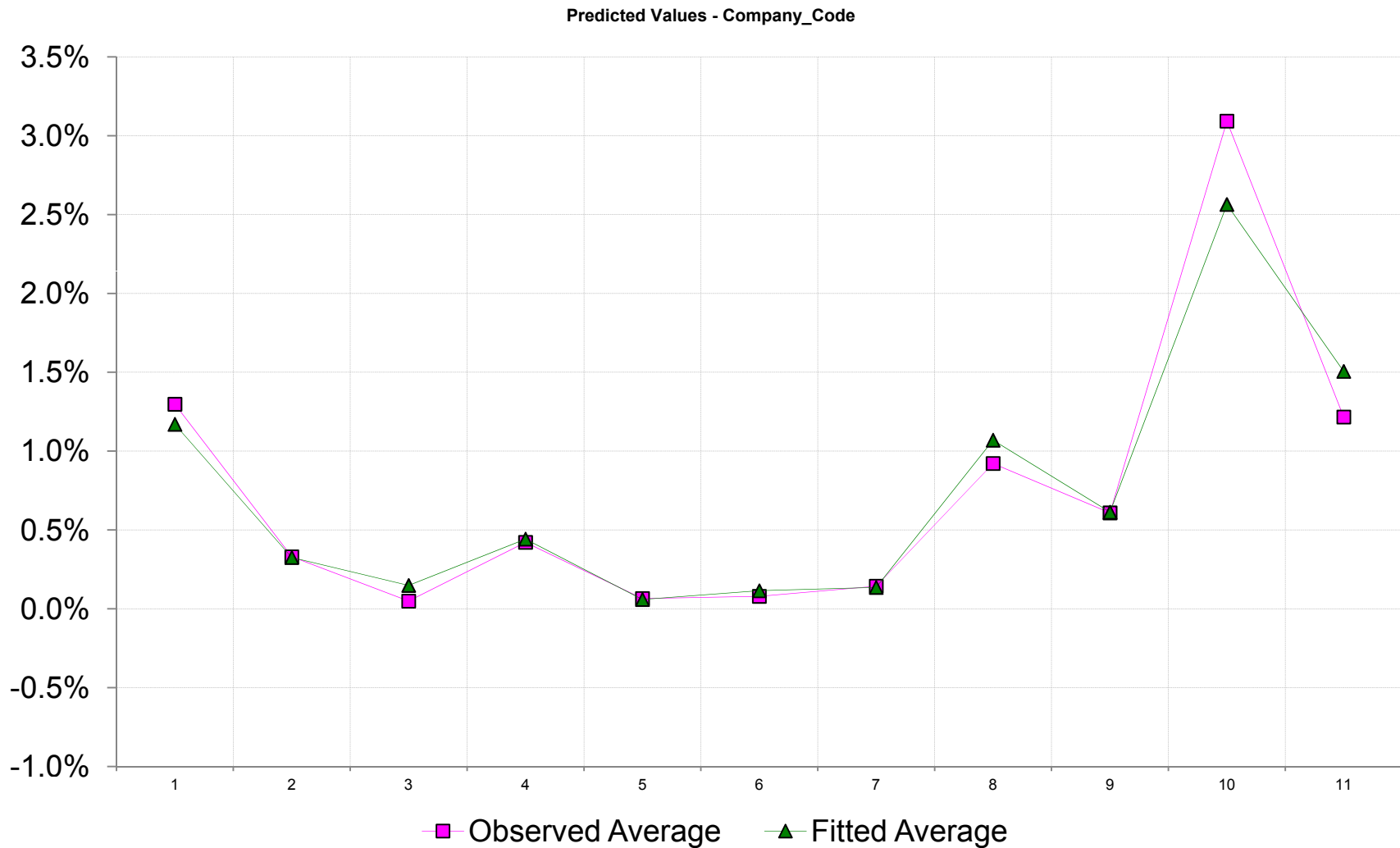
Back-testing by company

- This graph shows a comparison of observed vs. predicted incidence rates by company in the study
- While the factor “company” is not in the model, observed and predicted are close
- This indicates that most differences between observed incidence rates can be attributed to differences in composition of business (age, gender, marital status, duration, underwriting type etc.) among the companies
- Note that company codes have been anonymized

Experience Table



Back-testing by company



Other models to be released

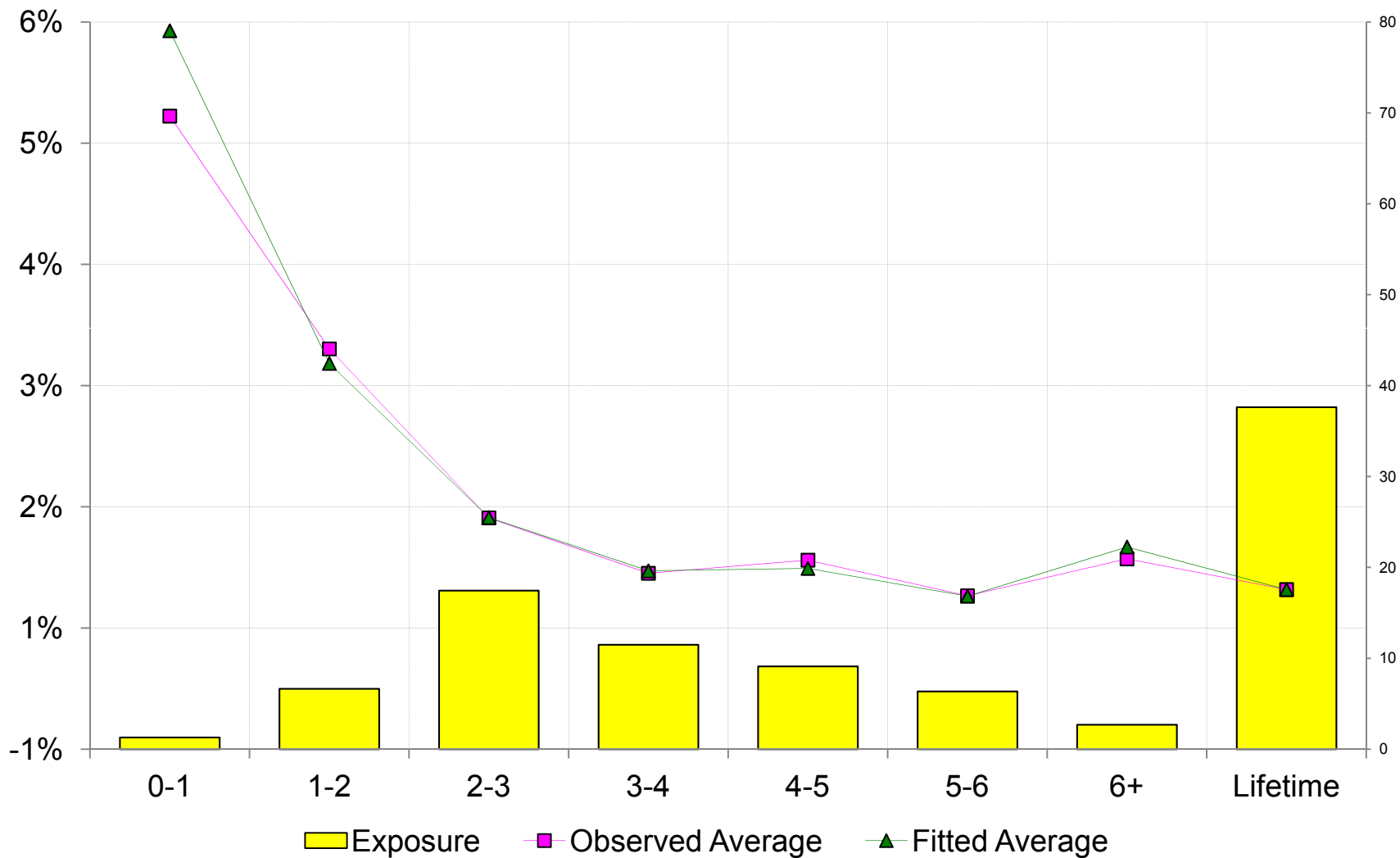
- Claim termination
 - Total termination with diagnosis & claim type
 - Total termination without diagnosis or claim type
 - Termination due to death with diagnosis & claim type
 - Termination due to death without diagnosis or claim type
- Claim utilization
 - With diagnosis & claim type
 - Without diagnosis or claim type

Benefit period factor analysis

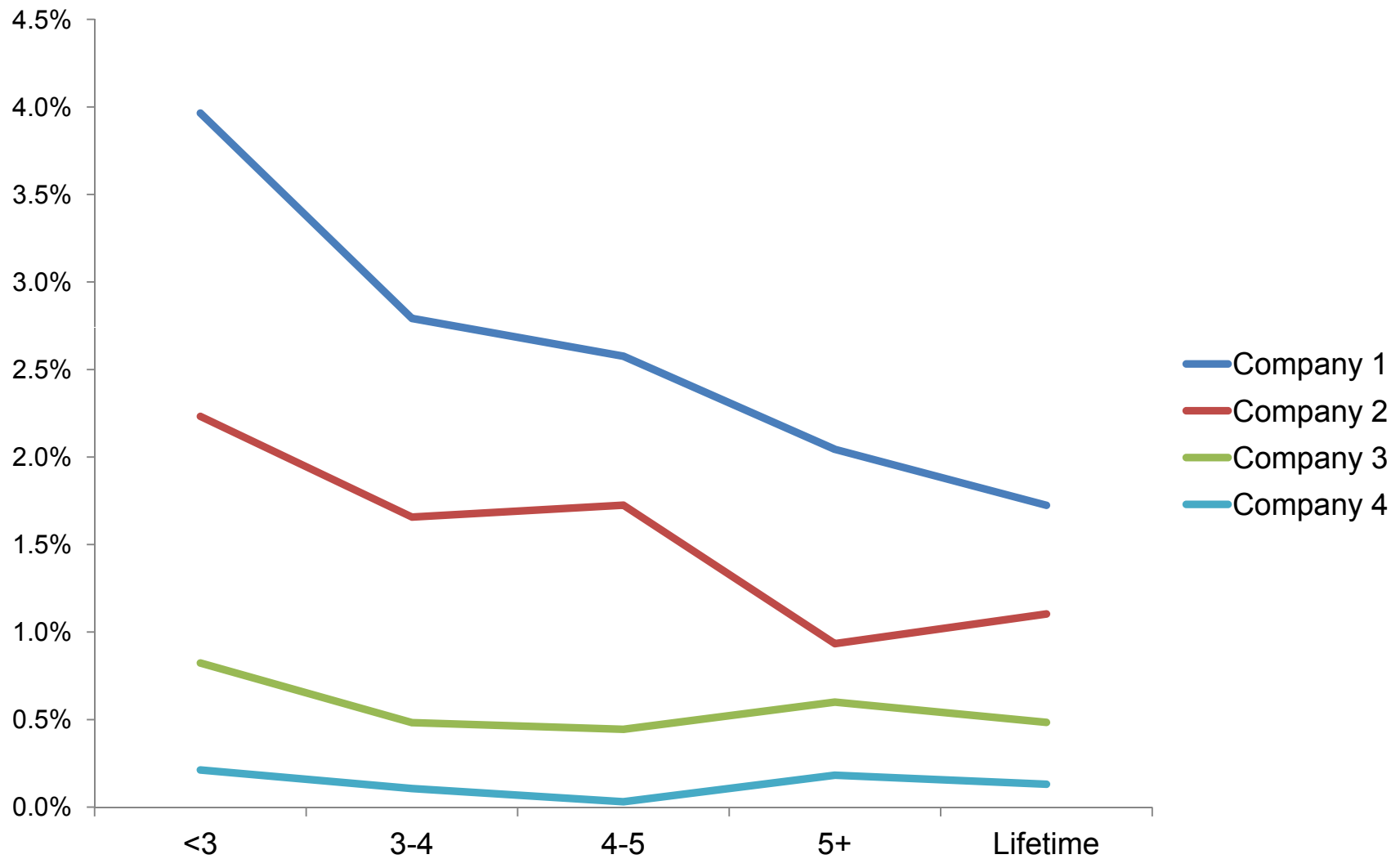


- Impact of benefit period on incidence was inconsistent with expectation
- Slightly higher incidence for limited BP
 - (less than 1.5% for active life model)
- Significant discussion / investigation about relationship
- Note: for claim termination and claim utilization,
 - lifetime BP yields higher morbidity costs

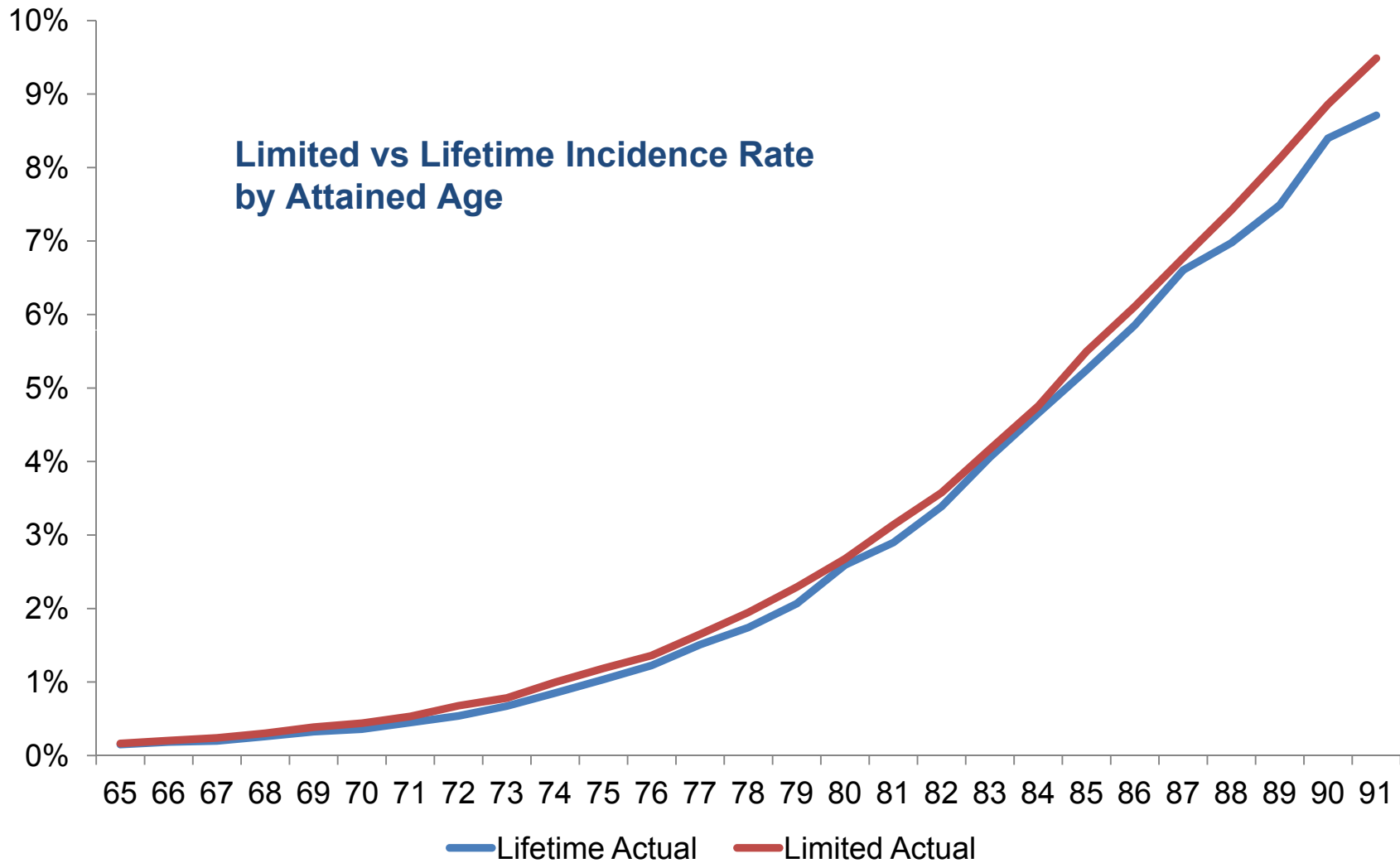
Benefit period factor analysis



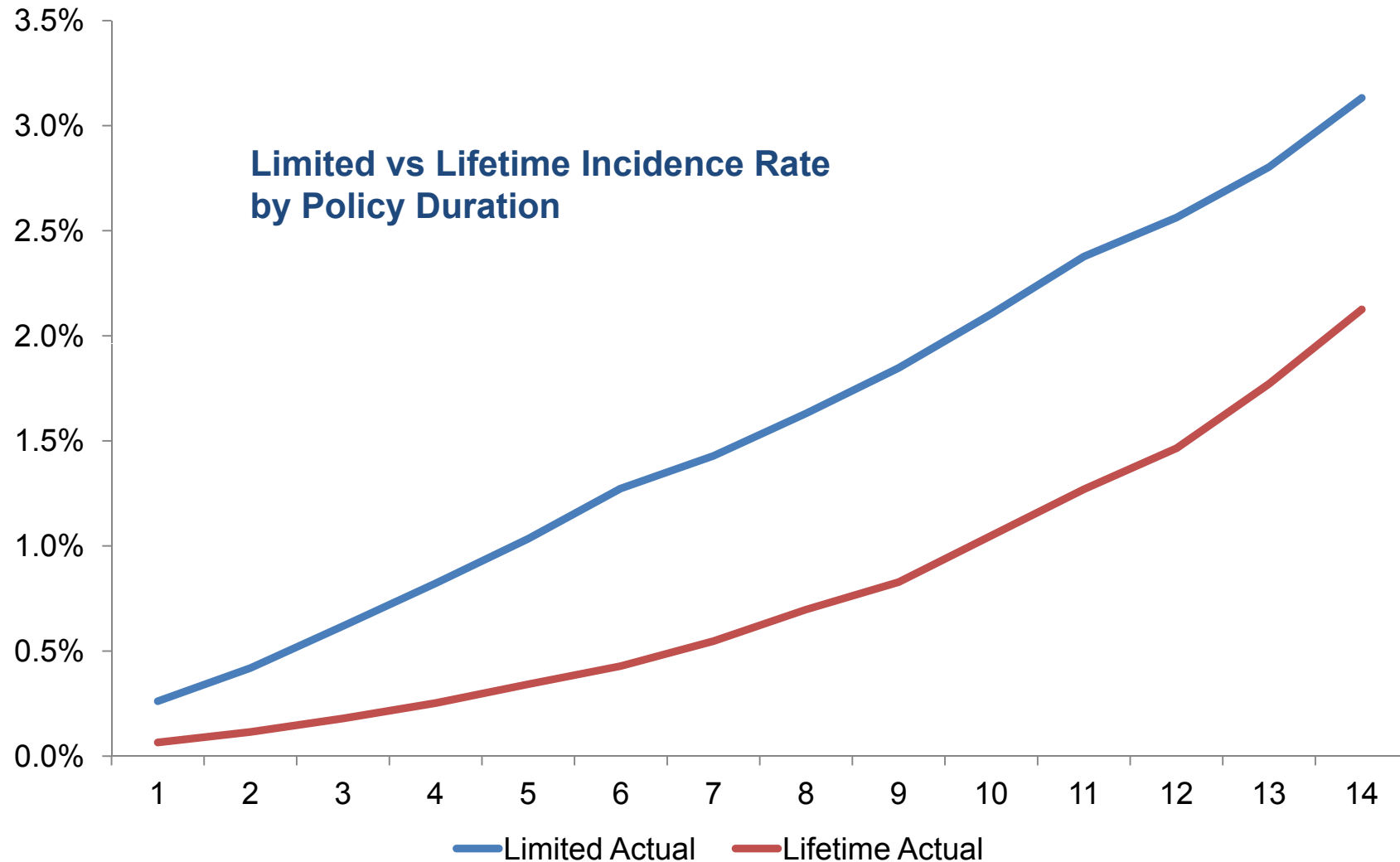
Benefit period factor analysis



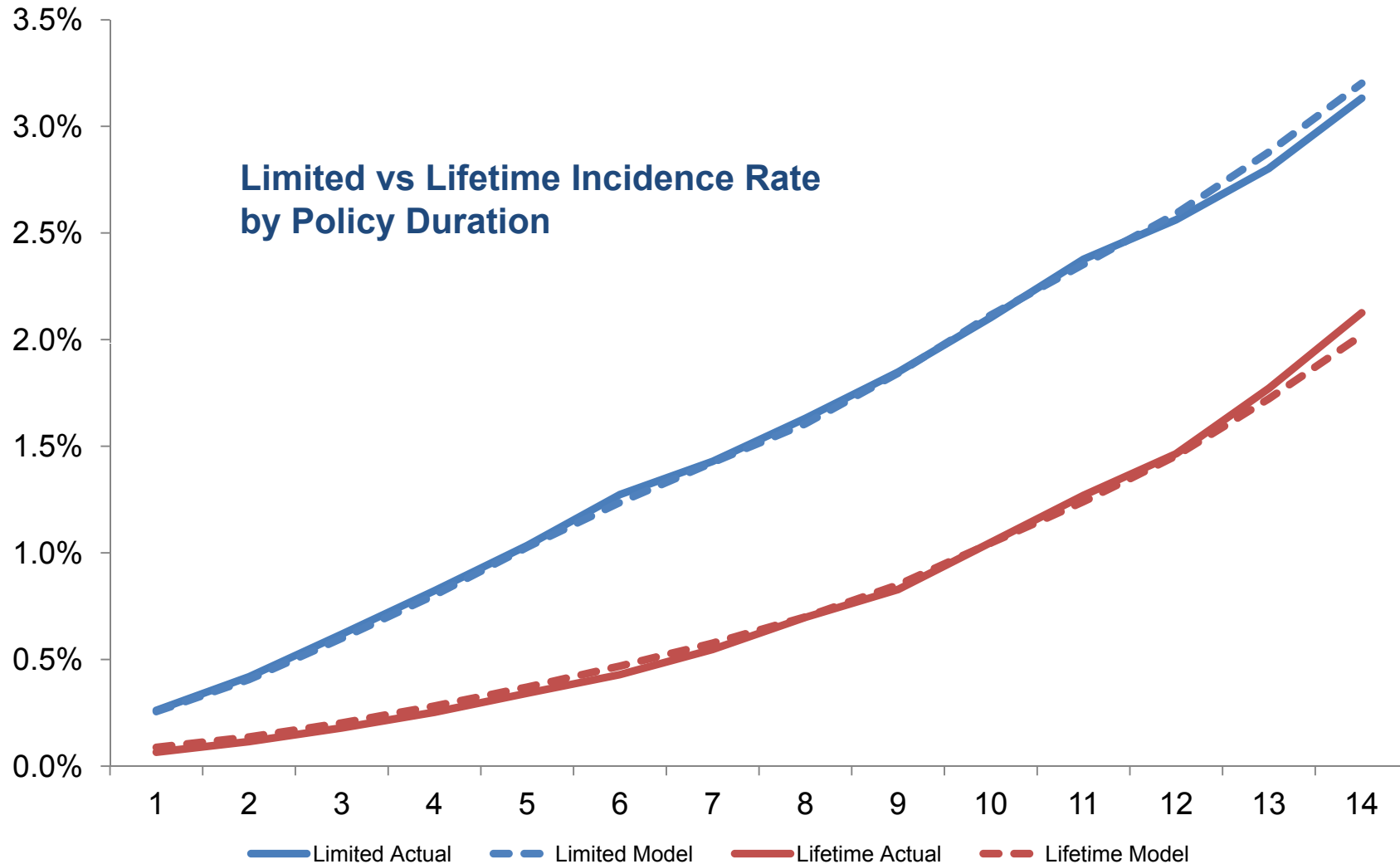
Benefit period factor analysis



Benefit period factor analysis



Benefit period factor analysis



Potential Drivers

- Other factors account for differences
- Coding of BP data received (internal vs external)
- Other factors not considered. Examples could include:
 - Company sales distribution model
 - Company specific underwriting guidelines
 - Mixture of companies included in study
 - etc

Special Thanks



Steering Committee

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- Barry Koklefsky
- Susan Oberman Smith
- Eric Perry
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- Steve Schoonveld
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- Perry Wiseblatt
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Society of Actuaries

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- Erika Schulty

Special Thanks - Participants



- Allianz
- Berkshire Life
- CalPers
- Continental Casualty
- Fortis
- Genworth Financial
- John Hancock
- Lincoln Benefit Life
- Mass Mutual
- MetLife
- Mutual of Omaha
- United of Omaha
- New York Life
- Northwestern Mutual
- Penn Treaty
- Prudential
- Senior Health
- State Farm
- Thrivent AAL
- Thrivent LB
- Transamerica – Aegon
- UNUM

- Questions?

Location of Aggregate Database Report

<https://soa.org/Research/Experience-Study/Ltc/research-ltc-study-2000-11-aggregated.aspx>