Post-Level Premium Period Experience
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Transamerica Experience Database – 10 Year Term

- Database filters
  - Issue years 1993 - 1997
  - Exposure years 1/1/2004 - 6/30/2008
  - Original face amounts $100,000+

- Experience characteristics
  - Policy years 7 - 16
  - Lapse: $34 billion exposed with $10 billion of lapses
  - Mortality: $32 billion exposed with $67 million of claims

- Block characteristics
  - 78% male
  - 94% nonsmoker
  - Average issue age 42
Lapse Experience

Lapse Experience – All

![Graph showing lapse rate over policy years](image-url)
Lapse Experience – By Gender

Lapse Experience – By Smoking Status
Lapse Experience – By Issue Age

Lapse Experience – By Original Face
Policy Year 10+11 Summary

- Lapses are concentrated at the end of policy year 10 and the first few months of policy year 11
- Overall 10+11 heaped rate is 83%

- Gender
  - Male = 79%
  - Female = 84%

- Smoking Status
  - Nonsmoker = 83%
  - Smoker = 83%

- Issue Age
  - Age 30 = 73%
  - Age 40 = 82%
  - Age 50 = 88%

- Face Amount
  - $100-249k = 78%
  - $250-999k = 82%
  - $1000k+ = 86%

Distribution of 10+11 Heaped Lapse Rates

![Bar chart showing the distribution of 10+11 heaped lapse rates with categories 65-78%, 78-85%, 85-93%, and 98-100%.]
Mortality Experience

Mortality Study Details

- Expected table is the SOA 2001 VBT (gender and smoking distinct)
- Exposure amounts
  - Pol yr 7-10 = $26.8 billion
  - Pol yr 11-16 = $5.1 billion
- Claim amounts
  - Pol yr 7-10 = $44.5 million
  - Pol yr 11-16 = $22.7 million
- Claim counts
  - Pol yr 7-10 = 613
  - Pol yr 11-16 = 203
Mortality Experience – All

Mortality Experience – Issue Age
Mortality Experience – Original Face

![Chart showing mortality experience for Original Face with A/E ratios and policy years]

Mortality Deterioration – Summary

- **Combined**
  - A/E ratio 7-10 = 52%
  - A/E ratio 11-16 = 128%
  - Deterioration factor = 246%

- **Factor by Age**
  - Under 43 = 267%
  - 43 and Over = 222%

- **Factor by Face**
  - $100-249k = 147$
  - $250k and Over = 250%
Analyzing the Results

Dukes-MacDonald Selective Lapsation Model

- Lapses in excess of some baseline rate are anti-selective
- Total of expected deaths from the excess lapse group (“reverters”) and expected deaths from the group continuing their insurance (“persisters”) must equal the expected deaths arising from the original cohort using the baseline lapses
- Reverters follow the select mortality curve of a newly underwritten attained-issue-age group
- Conservation of deaths is used to mathematically solve for the mortality of the persisters
- Model also allows for only some portion (effectiveness rate) of the reverters to follow attained-issue-age mortality, the rest follow point-in-scale mortality
Sample Mortality – Male NS Issue Age 40
100% of 2001 VBT with 100% Effectiveness Rate

Input Data for Dukes-MacDonald Calculation

- **Lapse**
  - Baseline rate (policy years 7-9) ~10%
  - Heaped 10th year rate ~83%

- **Mortality**
  - Baseline A/E ratio (policy years 7-10) ~52%
  - Deteriorated A/E ratio (policy years 11-16) ~128%
  - Deteriorated A/E as a percent of baseline ~246%
Dukes-MacDonald Calculation – Effectiveness Rate

- Dukes-MacDonald mortality prediction is somewhat sensitive to the effectiveness rate assumption
- Predicted deterioration results for various effectiveness rate assumptions:

<table>
<thead>
<tr>
<th>Effectiveness Rate</th>
<th>Average Mortality Multiple</th>
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<tbody>
<tr>
<td>45%</td>
<td>190%</td>
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<tr>
<td>55%</td>
<td>210%</td>
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<tr>
<td>65%</td>
<td>230%</td>
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<tr>
<td>75%</td>
<td>250%</td>
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<td>85%</td>
<td>270%</td>
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</table>

Sample Calculation – Male NS Issue Age 40

- Baseline mortality is 52% of SOA 2001 VBT
- Effectiveness rate is 75%
- Calculation details

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<thead>
<tr>
<th>Policy Year</th>
<th>Lapse Rate</th>
<th>Base Cohort</th>
<th>Selective Reverters</th>
<th>Non-Selective Reverters</th>
<th>Persisters</th>
<th>Original Cohort Mortality Rate</th>
<th>Persisters Mortality Rate</th>
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<tbody>
<tr>
<td>1</td>
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<td>1,000,000</td>
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<td>2</td>
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Persister mortality is approximately 250% of original cohort
Shock Lapse and Mortality Deterioration
Observations on 10 Year Term Experience

- Effect of grace period is noticeable in the data
- Combined policy year 10+11 lapse rate by amount is around 83%
- Immediate post-shock lapse rates by amount are running between 15% and 20% in policy years 12-16
- Mortality deterioration as a percentage of baseline is approximately 245% over policy years 11-16
- Overall experience appears to follow a Dukes-MacDonald model with an effectiveness rate of 75% — i.e., lapses are not entirely anti-selective

Additional Resources

- Transactions of Society of Actuaries, 1980 Vol. 32
  - Pricing a Select and Ultimate Annual Renewable Term Product
    - Jeffery Dukes and Andrew M. MacDonald
- The Messenger, April 2010
  - Understanding Post-Level Experience
    - David Wylde
- Society of Actuaries
  - Report on the Survey of Post-Level Premium Period Lapse and Mortality Assumptions for Level Premium Term Plans
  - Report on the Lapse and Mortality Experience of Post-Level Premium Period Term Plans
    - Tim Rozar, Scott Rushing, Doug Knowling