

Recent Developments in Managing Mortality Risk

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Outline

- Current trends in life reinsurance
- Older Age Mortality and GREAT (Gen Re Elderly Assessment Technique)
- Table Shaving (a.k.a Expanded Standard)
- Premium Financing and SPIA – leveraged sales
- Management of Business Decisions
- CAPR (Classification and Assessment of Preferred Risks)

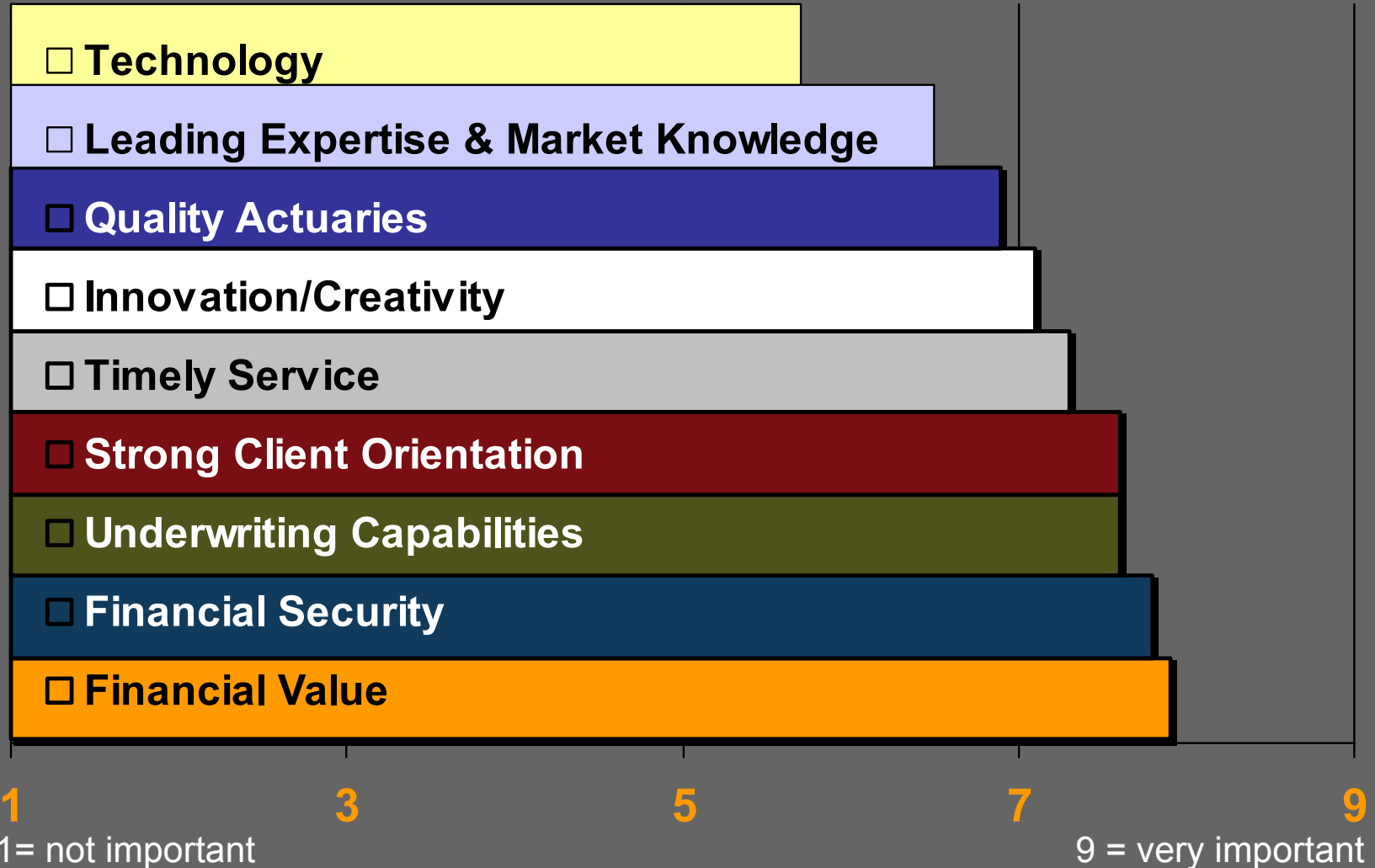
Current Trends in Life Reinsurance

- Consolidation
- Market hardening
- More audits
- Concerns with financial stability of reinsurers

Consolidation

- ERC, Phoenix Re, AUL
- RGA Re, Allianz Re
- Swiss Re, M&G, Life Re, Lincoln Re
- Munich Re, CNA Re
- Scottish Re, ING Re

Cedants Rank Evaluation Factors for Reinsurers



Tenets of Buying Reinsurance

Client assumes **credit risk** of reinsurer

for that they cede **underwriting risk**

*Warren Buffett
Stamford, CT
March 2003*

Older Age Mortality

“ It’s not the same old same old ”

Uncertainties at Older Ages

- Will underwriters be able to select cases that match “mathematical” picture of actuaries?
- Will underwriters be allowed to order needed requirements (costs, market practice, etc.)?
- Will underwriters order the right requirements to find nontraditional impairments that affect risk?



Death at old age often due to burden of comorbidity rather than any single impairment

Young age- Traditional Impairments Identified from Traditional Data Sources

Impairments

Data sources

Traditional impairments

Application

APS for large cases

**Exam with emphasis on
traditional impairments**

Laboratory tests

Driving status

Old age- Nontraditional Impairments Identified from Nontraditional Data Sources

Impairments

Traditional impairments

Dementia

Frailty

Geriatric syndromes

ADL failure

IADL failure

Accidents

Data sources

Application with special
questions for elderly

APS in almost all cases

Exam with emphasis on

(1) cognitive status

(2) physical performance

Laboratory tests

Driving status

Mortality Ratios Decrease with Age for Many Impairments

Mortality ratios (%) for policies issued to North American males with a history of the specified impairment*†

| Issue age | MI | CHD | Epilepsy | Emphysema | Diabetes |
|-----------|-----|-----|----------|-----------|----------|
| 30-39 | 928 | 522 | 314 | 757 | 297 |
| 40-49 | 638 | 332 | 200 | 414 | 208 |
| 50-59 | 474 | 255 | 177 | 321 | 188 |
| 60-69 | 272 | 176 | 166 | 214 | 160 |
| 70-79 | ? | ? | ? | ? | ? |
| 80-89 | ? | ? | ? | ? | ? |

* Medical Impairment Study. Volume 1, 1983, p. 64-65. Policies in force between 1962 and 1977.

† MI = myocardial infarction; CHD = coronary heart disease.

- MR for many impairments decrease to age 60-69
 - Not true for cancer, heart murmur, some other impairments
- If trend continues, insured lives MR would probably be lower at older ages

At Older Ages, Relative Risk (mortality ratio) Lower but Absolute Risk (mortality cost) Much Higher

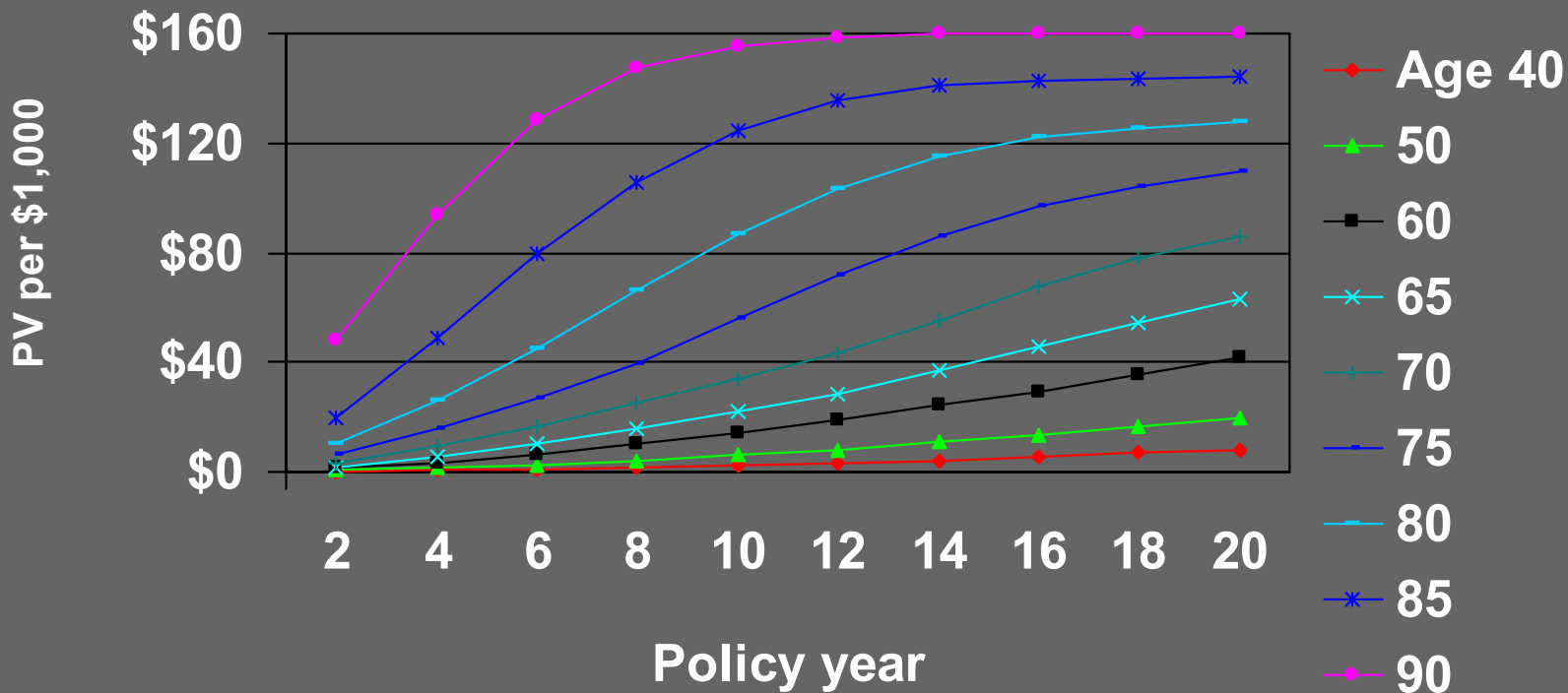
At older ages, many impairments considered “higher risk” at younger ages would be assessed at lower ratings



Important implications for pricing, profitability, marketing, routine underwriting practice

With Increasing Age, Much Higher Cost of Reducing +75 Rating to +50

Present value of a 25% increase in mortality ratio per \$1,000 insurance*



* 1990-1995 SOA Select Table, discounted at 5%, assumes no policy lapses

Reducing +75 Rating to +50 at Age 80 Equivalent to Reducing +400 Rating to Standard at Age 40

Comparison of the monetary value of one table (+25) of extra mortality at older vs. younger ages*†

| One table at | Number of tables at indicated age | | | |
|--------------|-----------------------------------|--------|--------|--------|
| | Age 40 | Age 50 | Age 60 | Age 70 |
| Age 80 → | 15.7 | 6.4 | 3.1 | 1.5 |
| Age 70 | 10.6 | 4.3 | 2.1 | -- |
| Age 60 | 5.1 | 2.1 | -- | -- |

* 1990-1995 SOA Select Table, discounted at 5%, assumes no lapses.

† e.g., one table at age 80 is the monetary equivalent of 15.7 tables at age 40.

+50 = “Real” Money, Especially at Older Ages

Is the case standard or +50? Present value of the difference after 20 years, by age and policy size*

| Age | Present value (\$) per | | Present value (\$) by policy size | |
|-----|------------------------|--|-----------------------------------|-------------|
| | \$1,000 insurance | | \$100,000 | \$1,000,000 |
| 40 | 16 | | 1,614 | → 16,137 |
| 50 | 39 | | 3,908 | 39,085 |
| 60 | 80 | | 8,042 | → 80,423 |
| 70 | 157 | | 15,744 | 157,441 |
| 80 | 221 | | 22,095 | 220,950 |
| 90 | 274 | | 27,390 | 273,896 |

* 1990-1995 SOA Select Table, discounted at 5%, assumes no lapses.

Conclusions- Underwriting / Pricing at the Older Ages

- Death at old age often due to burden of comorbidity rather than any single impairment
- Traditional data sources identify traditional impairments
- New nontraditional data sources – particularly routine cognitive and physical performance testing – needed to identify nontraditional impairments that often cause death in the elderly
- At older ages, relative risk (mortality ratio) lower but absolute risk (mortality cost) much higher

Conclusions- Underwriting / Pricing at the Older Ages

- Failure to collect adequate premium for what is incorrectly perceived as “low risk” situations becomes important as early as age 60
- Examine pricing / underwriting philosophy at older ages, particularly regarding willingness to
 - Reduce / eliminate what is incorrectly perceived as “small” ratings of +25 / +50
 - Accept all cases up to +35 at standard rate
- Define what constitutes +25 (Table 1) rating at older ages and issue cases at +25 when appropriate

GREAT Risk Assessment in the Elderly Audit

Conventional Risk Assessment Assumptions

1. Disease is uncommon; most applicants are healthy
2. Application part 2, paramed, lab, and attending physician statement identify and characterize health and mortality risk
3. Mortality risk corresponds to medical diagnosis
4. Cardiovascular risk factors effectively predict mortality

Does this work in the elderly?

What's Wrong With This Picture?

IT'S NEVER TOO LATE!

- **Conventional underwriting assumptions fail in the elderly population**
- **Industry persists in conventional underwriting of the elderly population**
- **Accounts for underwriter discomfort**
- **Generates compensating caution**
 - **Reluctance to offer insurance**
 - **Higher rating to hedge against unknowns**

Gen Re LifeHealth Strategy

- GREAT (Gen Re Elderly Assessment Technique)
 - Patent Pending
- OBJECTIVE, DIRECT, FUNCTIONAL assessment of every applicant
- Practical
 - Perform by paramed in single home visit
 - Modest increase in time/cost
 - Affirmed by major paramed providers
- Specific and valid for elderly mortality risk
 - Clinical literature
 - Consultation with Thomas Gill, MD, Yale Medical School geriatrician
 - Gen Re LifeHealth research

Delayed Word Recall List

- Chimney
- Salt
- Harp
- Button
- Meadow
- Train
- Flower
- Finger
- Rug
- Book

Validation

Delayed Word Recall

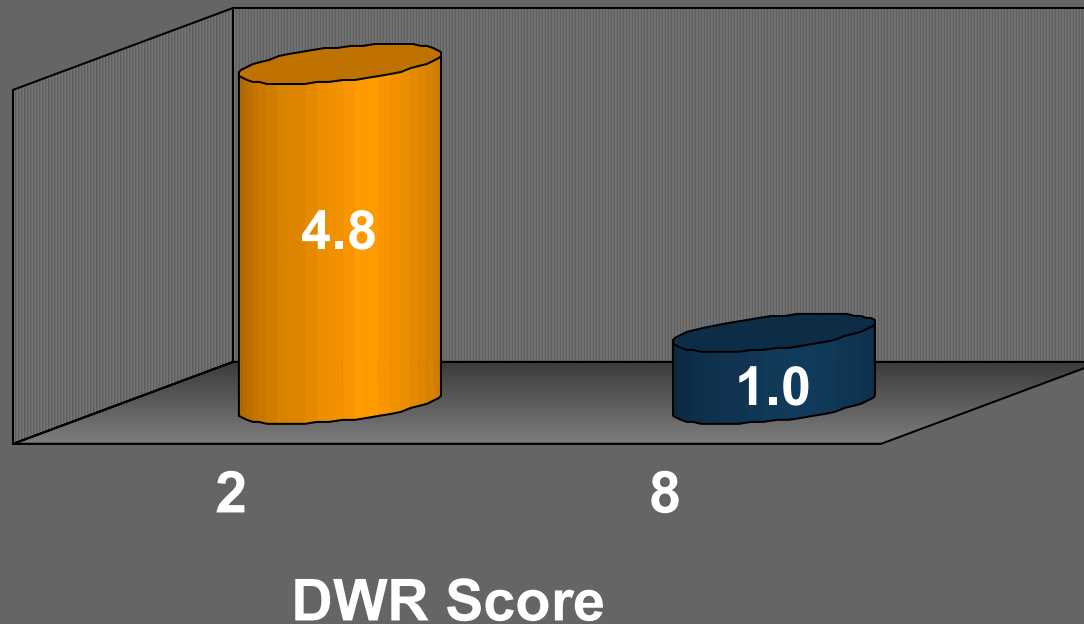
- Most important predictor in Cardiovascular Health Study
- Gen Re LifeHealth Mortality Study
 - Laura Vecchione, MD
 - Eric Golus, FSA
 - Tom Hartlett

Gen Re LifeHealth DWR Mortality Study

- Surrogate for elderly life insurance in force, typical underwriting
- Population of LTCI applicants
 - Age 70 – 99, average 78.4
 - Up to 7 years of follow up (average 5 years)
 - 11,587 lives, 1012 deaths
- LTCI underwriting action:
 - Issued
 - Declined solely due to cognitive impairment
- Mortality determination
 - Social Security Death Master File: Public record of all deaths
 - Match of applicant to SSDMF determines vital status and date of death

Gen Re LifeHealth DWR Mortality Study

Comparative Mortality Rate



10% of applicants account for 50% of mortality

Physical Function: Repeated Chair Rise

- Established protocol in clinical geriatric assessment
 - Straight, hard chair without arms, seat height 17”
 - Count number of repetitions completed in 30 seconds

GREAT Underwriting Outcome

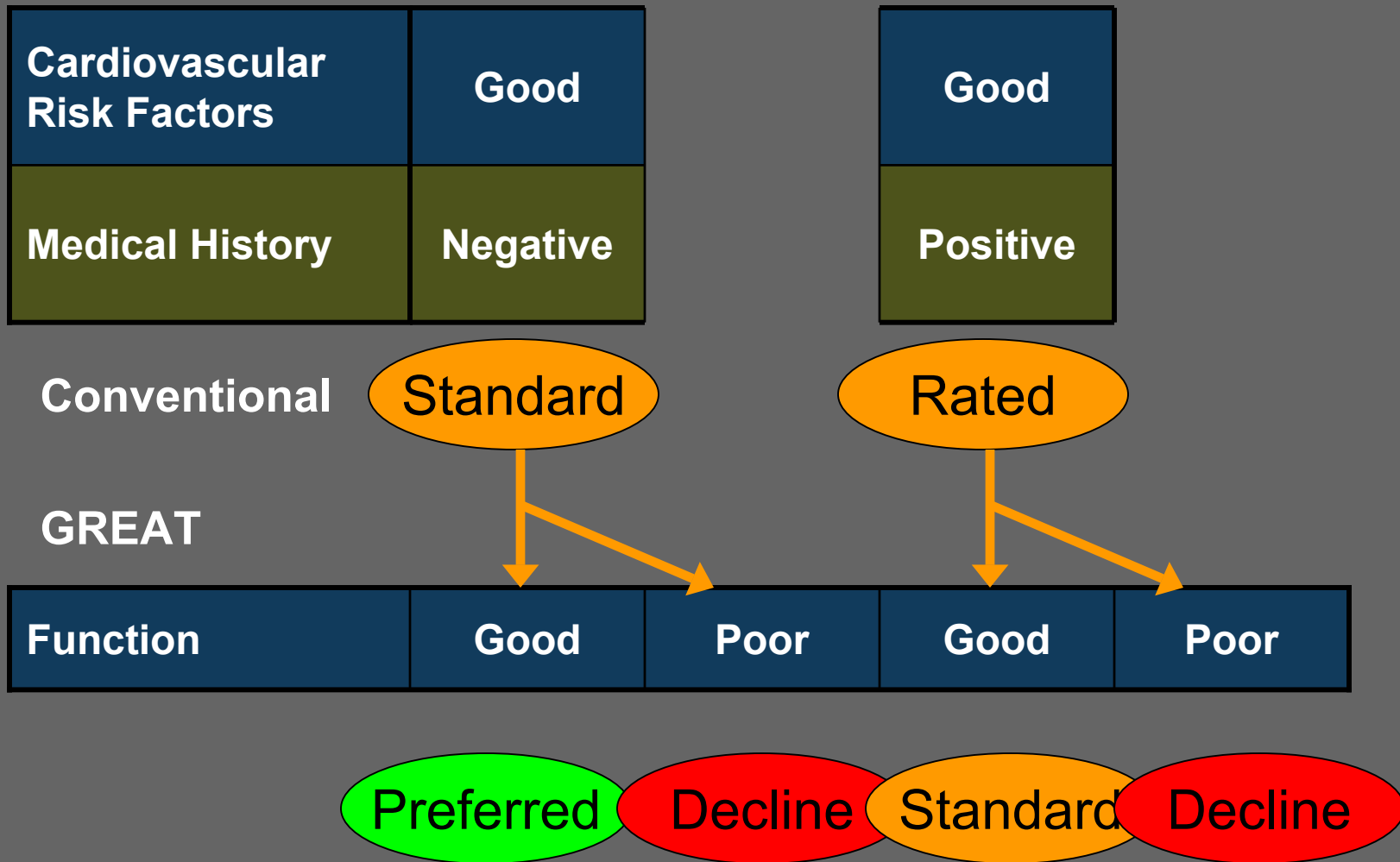


Table Shaving Programs

a.k.a Expanded Standard

Table Shaving

- Has been active for at least 25 years
- There has been an expansion in the past 5 years
- Still, the majority of direct writers do not participate

Program Parameters for Table Shaving

- Program description
- Eligible products
- Age limits
- Min / max face amounts
- Exclusions (I.e. flat extra's, combination ratings, impairments)

Pricing for Table Shaving

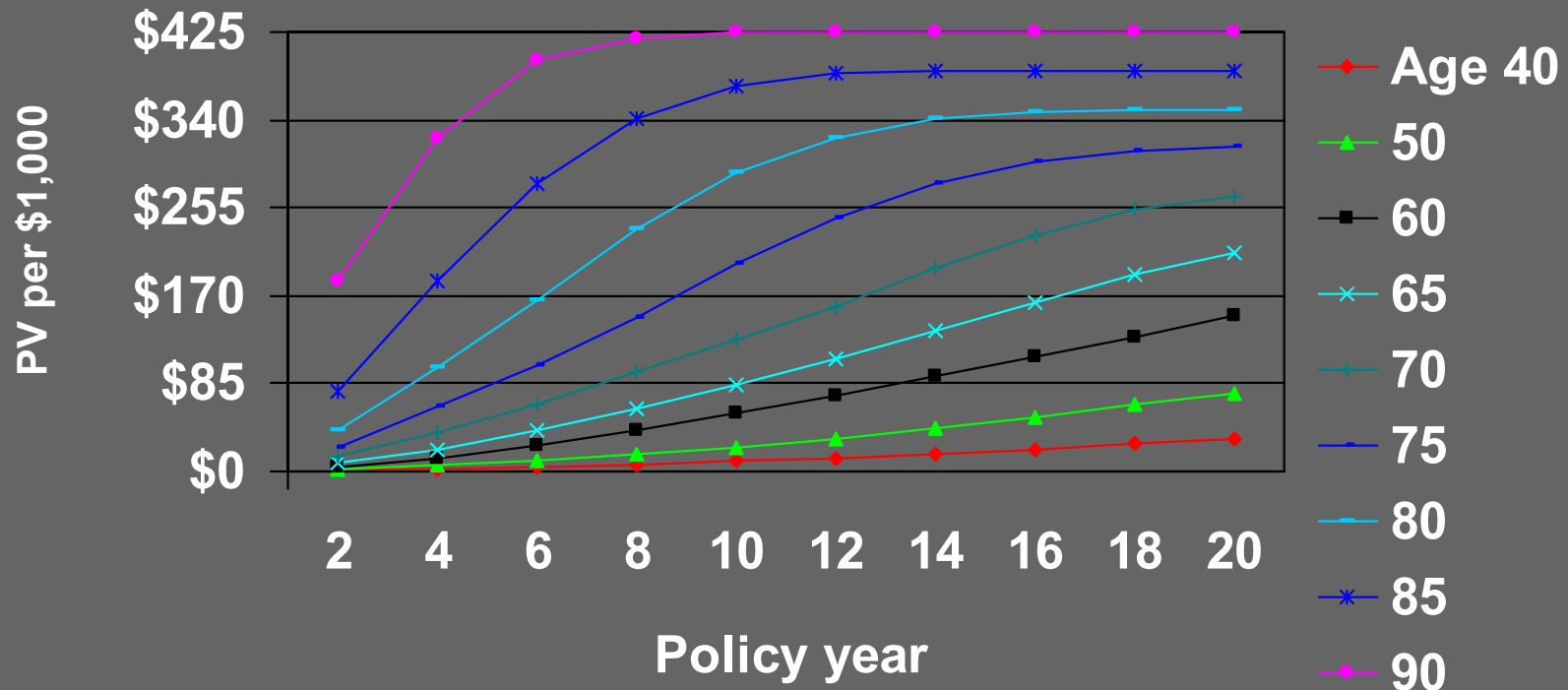
- Stand alone (Separate Rates)
- Blended / Embedded Rates
- Some ceding companies absorb the extra mortality cost.

Risk Management Considerations

- Distribution Risk
- Pressure to “squeeze” risk into the program
- Older ages
- Importance of reporting for monitoring
- Auditing is integral to management of program.

With Increasing Age, Much Higher Cost of “Table Shaving” Program That Reduces +100 Rating to Standard

Present value of a 100% increase in mortality ratio per \$1,000 insurance*



* 1990-1995 SOA Select Table, discounted at 5%, assumes no policy lapses

Premium Financing and SPIA – Leveraged Sales

+ High Face Amounts + Older Ages = Pressure

Target Market for Premium Financing

- For older individuals with significant assets
- Minimum net worth - \$5 to \$10 million
- Assets may not be liquid
- Assets may earn more than interest on loan Distribution Risk

Risk Management Concerns for Premium Financing

- The market
- The pressure
- Option C – Return of Premium
- SPIA – leveraged sales
- Persistency
- Extended Maturity Options

SPIA Leveraging

No ROP, Age 85

| End Of | No Loan / No Annuity | No Loan / Annuity |
|--------|----------------------|-------------------|
| 1 | 4,643 | 3,085 |
| 2 | 4,286 | 3,085 |
| 3 | 3,929 | 3,085 |
| 4 | 3,572 | 3,085 |
| 5 | 3,215 | 3,085 |
| 6 | 2,858 | 3,085 |
| 7 | 2,501 | 3,085 |
| 8 | 2,144 | 3,085 |
| 9 | 1,787 | 3,085 |
| 10 | 1,430 | 3,085 |

Net Proceeds at Death = DB – Premiums – Loan – Interest on Loan

Note: I ran at age 65 and concluded that at that age purchase of an SPIA did not make sense

SPIA Leveraging

ROP 5% interest, Age 85

| End Of | Loan / No Annuity | Loan / Annuity |
|--------|-------------------|----------------|
| 1 | 4,989 | 844 |
| 2 | 4,969 | 1397 |
| 3 | 4,941 | 1991 |
| 4 | 4,909 | 2,627 |
| 5 | 4,873 | 3,308 |
| 6 | 4,836 | 4,036 |
| 7 | 4,801 | 4,813 |
| 8 | 4,770 | 5,641 |
| 9 | 4,745 | 6,524 |
| 10 | 4,730 | 7,464 |

Net Proceeds at Death = DB – Premiums – Loan – Interest on Loan

Note: I ran at age 65 and concluded that at that age purchase of an SPIA did not make sense

SPIA Leveraging

ROP 5% Interest, Age 85

Assume insured is 150%, rated 100% for life insurance and 150% for annuity

| End Of | Revised (Loan / Annuity) | Original (Loan / Annuity) |
|--------|--------------------------|---------------------------|
| 1 | 1,372 | 844 |
| 2 | 1,958 | 1,397 |
| 3 | 2,584 | 1,991 |
| 4 | 3,252 | 2,627 |
| 5 | 3,965 | 3,308 |
| 6 | 4,725 | 4,036 |
| 7 | 5,534 | 4,813 |
| 8 | 6,395 | 5,641 |
| 9 | 7,310 | 6,524 |
| 10 | 8,282 | 7,464 |

Net Proceeds at Death = DB – Premiums – Loan – Interest on Loan

SPIA Leveraging

Assume insured is 150%, rated 100% for life insurance and 200% for annuity

| End Of | Revised (Loan / Annuity) | Original (Loan / Annuity) |
|--------|--------------------------|---------------------------|
| 1 | 1,819 | 844 |
| 2 | 2,432 | 1,397 |
| 3 | 3,085 | 1,991 |
| 4 | 3,781 | 2,627 |
| 5 | 4,521 | 3,308 |
| 6 | 5,308 | 4,036 |
| 7 | 6,145 | 4,813 |
| 8 | 7,033 | 5,641 |
| 9 | 7,975 | 6,524 |
| 10 | 8,974 | 7,464 |

SPIA Leveraging

Assume insured is 150%, rated 150% for life insurance and 200% for annuity

| End Of | Revised (Loan / Annuity) | Original (Loan / Annuity) |
|--------|--------------------------|---------------------------|
| 1 | (1,297) | 844 |
| 2 | (84) | 1,397 |
| 3 | 1,209 | 1,991 |
| 4 | 2,587 | 2,627 |
| 5 | 4,052 | 3,308 |
| 6 | 5,611 | 4,036 |
| 7 | 7,267 | 4,813 |
| 8 | 9,024 | 5,641 |
| 9 | 10,890 | 6,524 |
| 10 | 12,868 | 7,464 |

Conclusions - Risk Management Concerns about Premium Financing

- Older Ages
- Increasing Risk Amounts
- Persistency
- Extended Maturity Options
- Insurable Interest (sometimes)

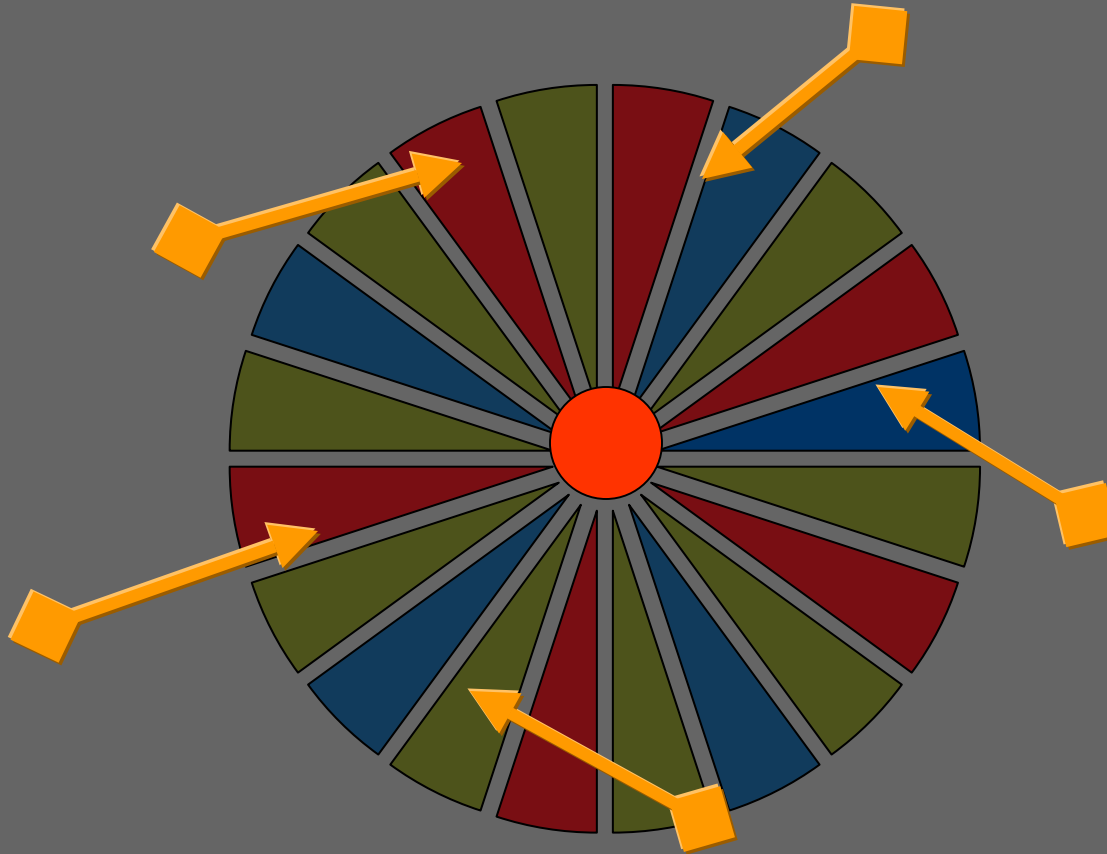
Managing Business Decisions

Hitting near the target

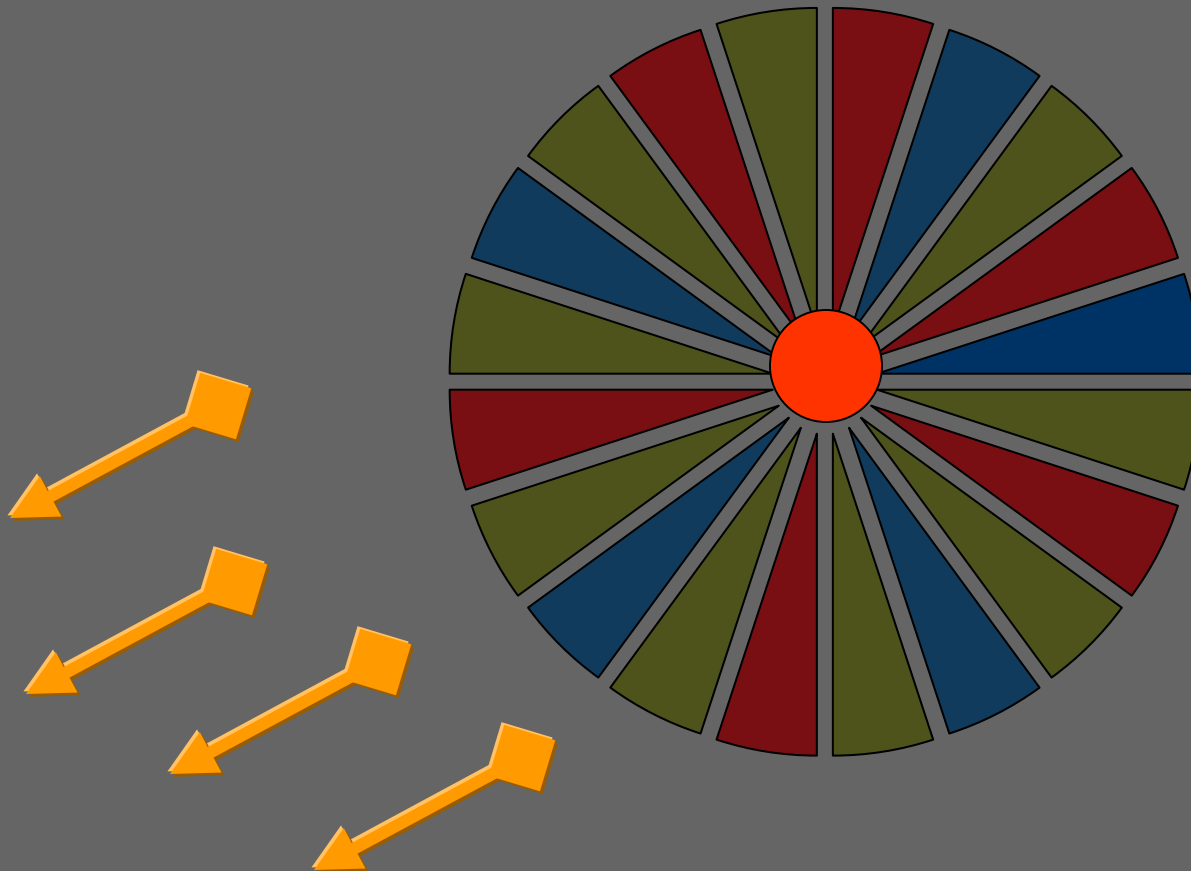
Managing Business Decisions



Managing Business Decisions



Managing Business Decisions



Managing Business Decisions

- Business decisions (exceptions) have become part of the norm in direct underwriting.
- For facultative cases, the reinsurer makes the final decision.
- Often made on cases that are reinsured automatically.

Managing Business Decisions

- Types of Business Decisions
 - Reduction of rating
 - Waive Requirement(s)
 - Other

Managing Business Decisions

- Managing Business Decisions on Automatic Business
 - More frequent and detailed audits to determine frequency and level of exception .
 - Determine an “acceptable” exception rate at the time of pricing.
 - Treaty Provisions.
 - Encourage clients to discuss these cases with reinsurer for an alternate mutually acceptable solution.
 - Goal is consistency

Managing Business Decisions

- Managing Business Decisions on Facultative Business
 - Key Accounts
 - Determine cost of the exception
 - Consult with Medical Department
 - File Documentation
 - Approval by underwriting management
 - Track all exceptions

Managing Business Decisions

- Managing Business Decisions on Automatic Business
 - Include guidelines in the treaty
 - Set a budget that reflects impact on mortality
 - Distinguish by age, class and size
 - Sign - offs
 - Track and report
 - Audit
 - Remedies

Conclusions – Managing Business Decisions

- Communicate
- Document
- Maintain consistency
- Audit

CAPR Audit Classification / Assessment of Preferred Risks

Underwriting Audit: State of the Art

- Experienced underwriter reviews 100 cases
- Elements
 - Documentation
 - Development of appropriate data
 - Consideration of all relevant material
 - Adherence to criteria

Underwriting Audit: Goal and Limitations

- Determine rate of adherence
 - Benchmark is at least 95%
- Determine business impact
 - Usual method of scoring counts all deviations equally
 - Margin of observer agreement allowed
- Power

CAPR

(patent pending)

applicant pool

- Data on each life:**
- Age
 - Sex
 - Face amount
 - Height
 - Weight
 - Blood pressure
 - Labs
 - Underwriting Action

- Rating Guide:**
- Build chart
 - Blood pressure
 - Labs

substandard

aggregate standard

Urine Cotinine

smokers

aggregate standard NS

- Preferred Criteria:**
- Age Sex
- Build
 - BP
 - TC
 - HDLC
 - TC/HDLC
 - BP TX

PF1

PF2

PF(n)

residual standard

CAPR Audit

- Underwriting performance audit
 - CAPR measures client decision against indicated decision
 - Frequency and mortality implication for deviation
 - Cumulative mortality/premium impact
 - Characterize deviations