Adverse Selection Spirals

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The Right to Underwrite ?

- Sex Discrimination
  - Unisex Pensions ? (USA, Australia, UK)
  - MV insurance (Canada)
- HIV/ AIDS
- Genetic Testing

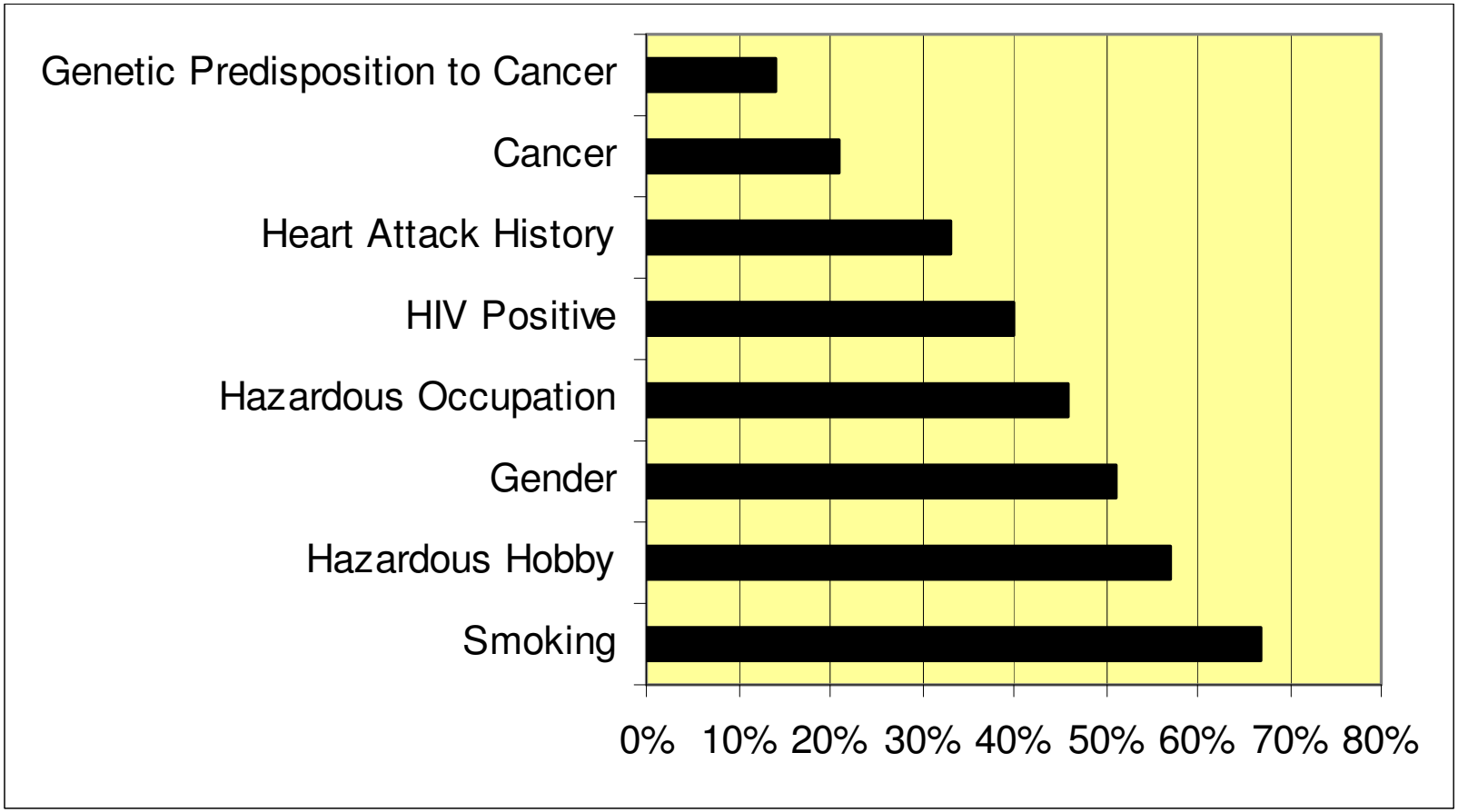
In favour of Risk Classification

- "Actuarial Fairness"
- Preventing Adverse Selection Spirals
  - Increasing Premiums
  - Market Failure ?

Objections to Risk Classification

- Someone always loses
- Is “actuarial fairness” really fair?
  - MAP survey
  - Australian survey on genetics
- More disadvantages for the disadvantaged ?
  - Battered wives (USA)
  - Credit Scoring (USA)

Attitudes to Underwriting (Map 1990)



Objections to Risk Classification

- Privacy Issues
  - Aids / HIV and sexual preference
  - Genetics and eugenics
- Public Health Issues
  - Aids / HIV Controversy in UK
  - Genetics
- Heterogeneity in Risk Groups
  - Fairness to individuals ? Manhart decision

Cost / Benefit Analysis

Q. *If the government / public opinion imposes restrictions on the use of certain risk classification factors….. what will be the effect on premium rates and demand for insurance ?*

Will it be

a 5% premium increase ?

a 20% increase ?

or complete market breakdown ? (spiral)

Have insurers been "crying wolf "? (unisex, genetics)

Building a Model

Actuaries v. Economists ?

Heterogeneous Population

R = Sum Insured purchased

X = Claim cost per $1 SI

Risk Group G

p(g) = Proportion of Popn in Group g

r(g) = Average Sum insured purchased

$\mu(g)$ = Average Claim cost per $1 SI

Adverse Selection Losses

No Risk Classification : Premium per $1 SI = E(X)

E[Premium Income] = E(R) E(X)

E[Claim Outgo] = E(RX)

E[Losses] = E(RX) - E(R)E(X)

= Cov(R,X)

= Cov[r(g), ❍(g)]

= sd[r(g)] * sd[μ(g)] * σ

Managing Adverse Selection

- Adverse Selection Losses depend on
  - Variance of E[Claim Cost] by risk group
  - Variance of E[Amounts Purchased] by risk group
  - Correlation

Positive correlation between Risk and Sum insured means poor risks buy more insurance

> losses

Losses can be controlled by product design, financial underwriting, targetted marketing etc.

Life Insurance Correlation

NEGATIVE Correlation: People with high SI have lower mortality rates than average (> 100 years)

"Active Selection"

> Information asymmetry (+)

"Passive Selection"

> Wealth Effect (-)

> Dependency Effect (-)

> Risk Aversion Effect (-)

Annuity Products

Positive Correlation : People with high annuity amounts have lower mortality

> Adverse selection losses

Practical Actuarial Solution:

- Break-even premium is calculated
- Use dollar-weighted mortality rates (1854 ?)
- pa(90) tables

BUT……. ?

Is the Past a guide to the Future ?

- *Assumption* : Relative Demand by different risk groups is stable
- BUT Demand changes when Market changes ...
  - Tax
  - Social Security
  - Competing Products
  - Risk Classification Structure

Market-sensitive demand

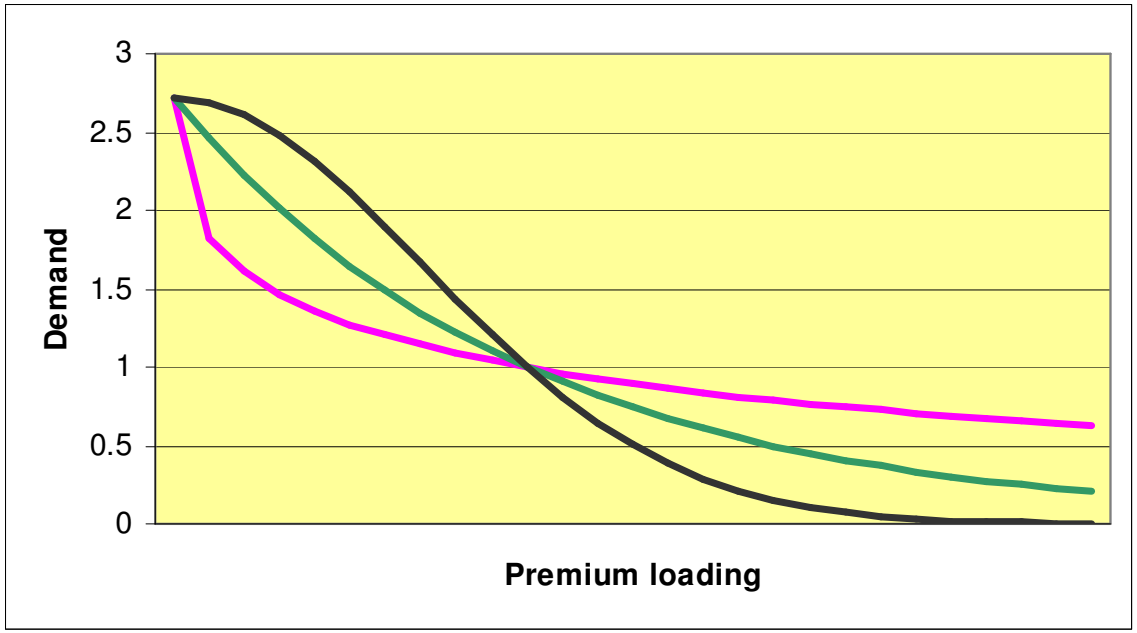
Assume Demand for group g varies with

- Expected claim cost for group g
- Premium rate π

γ is a price-sensitivity parameter

$$r(g,\pi) = d_g \exp\left[1 - \left(\frac{\pi}{\mu(g)}\right)^{\gamma}\right]$$

Flexibility of demand curve

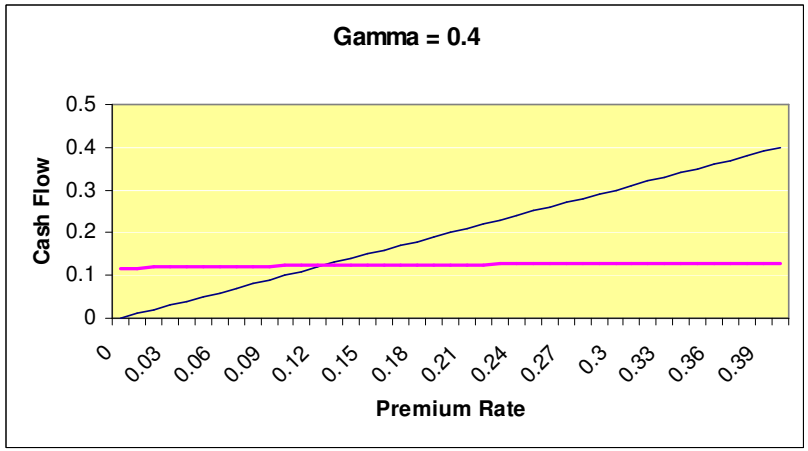


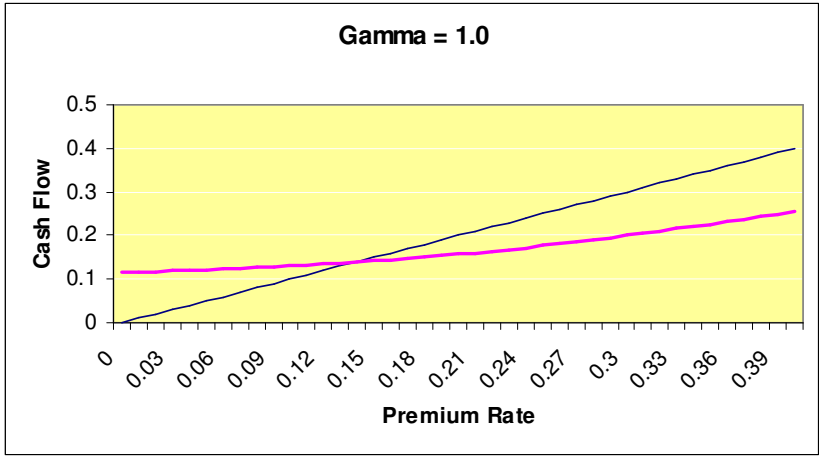
Equilibrium Conditions

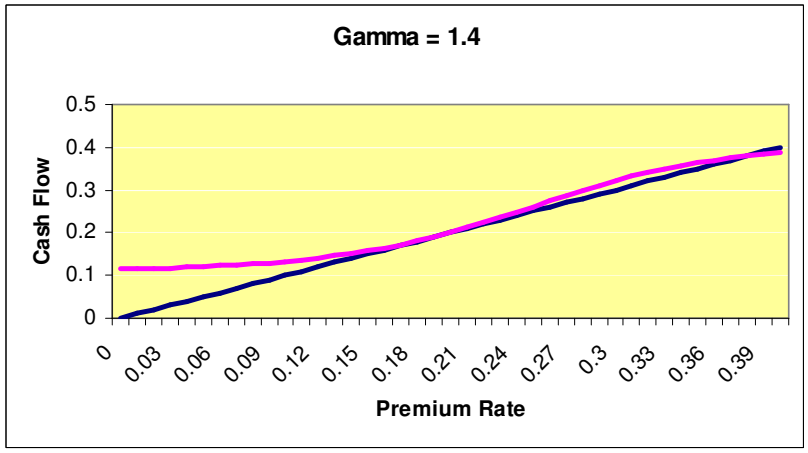
Equilibrium occurs in a competitive market when the insurer breaks-even (including capital costs)

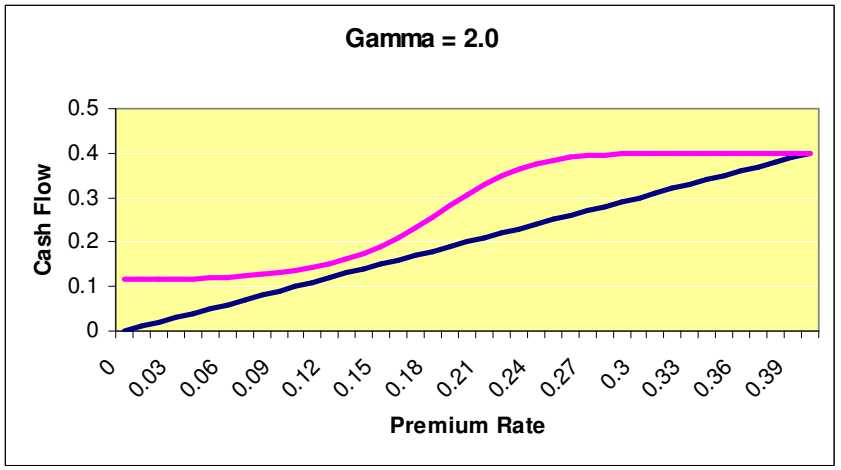
$$\pi = \frac{\sum_g r(g,\pi)\mu(g)p(g)}{\sum_g r(g,\pi)p(g)}$$

Chaotic Behavior : Tipping Points



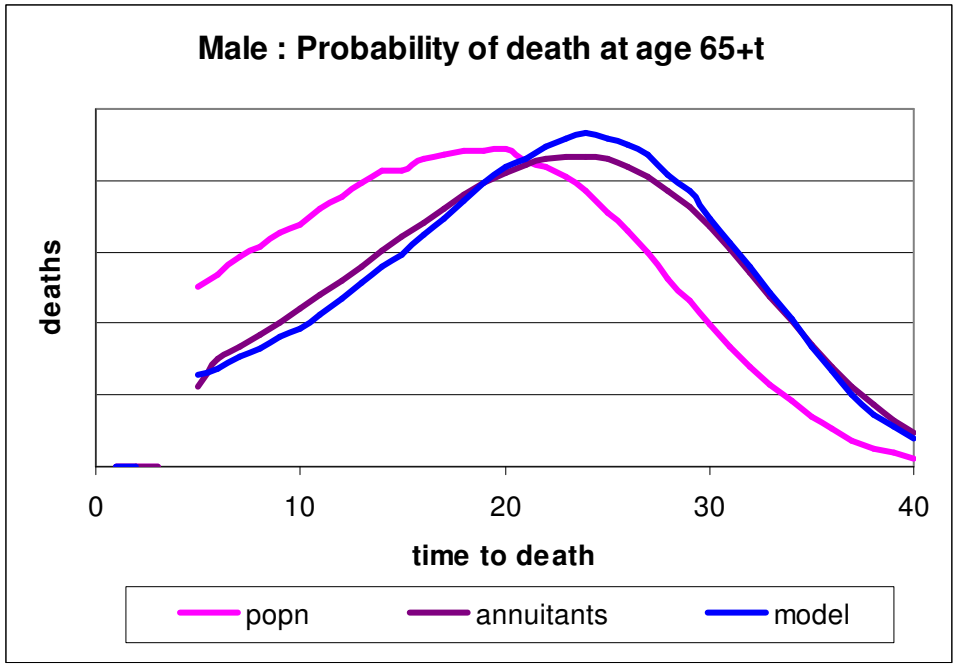






A Practical Example : UK Annuities

Step 1 : Fit model to current data to determine premium loading sensitivity parameters γ_ϕ



Effect of Unisex Premiums

Allow for Unisex Premium Requirement

– Male and Female Rates Must be Equal

Solve : Equilibrium Premium & Demand

	Males	Females
Gender Premium Rate	14.88	16.98
Unisex Premium Rate	16.54	16.54
Change in Demand	-59%	+22%

Effects of Unisex Requirement

- Female premiums fall slightly
- More females enter the market (+22%)
- Average female mortality rates increase as unhealthier women find it worthwhile to buy
- Male premiums rise significantly
- Many males drop out (-59%)
- Average male mortality rates fall as unhealthier men no longer find it worthwhile to buy

More interesting questions

- Empirical evidence on adverse selection
- Impact of proxy variables
- Sum insured as a rating variable
- Effectiveness of SI restrictions on underwriting (as in UK equity market)
- Critique of economists' models

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