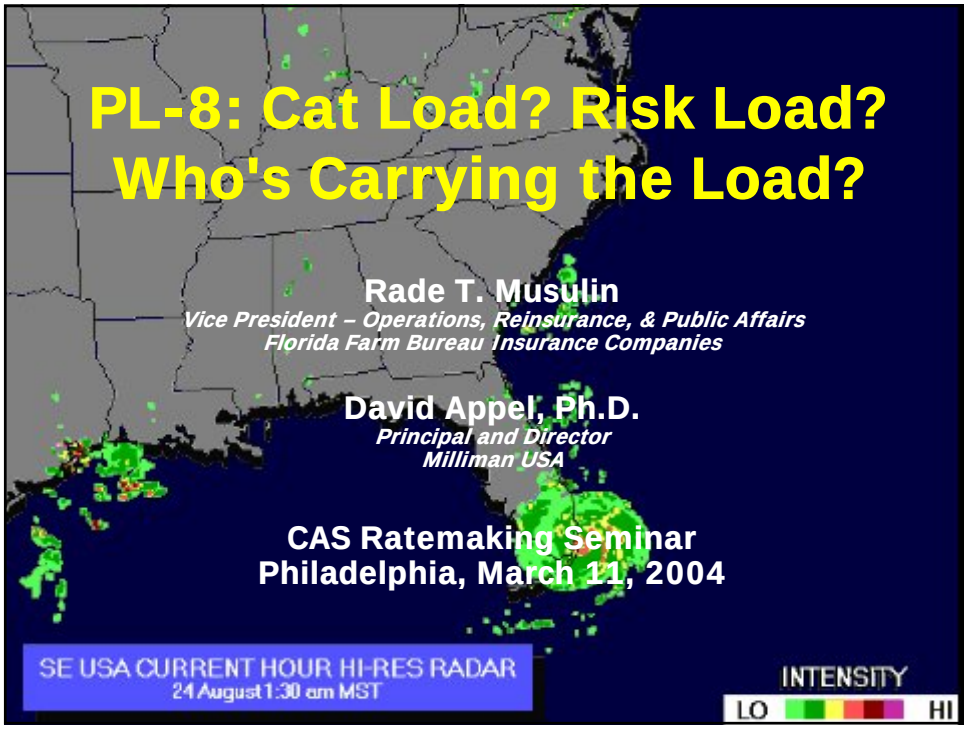


Questions

- Can risk loads be empirically determined or are they a function of investor utility?
- Are risk loads "static"?
- Do they depend on the market portfolio, the insurer's portfolio, the insurer's management risk tolerance, or is the correct load independent of these factors?
- Is it "unfairly discriminatory" for an insurer to charge similar risks different rates?
- Can risk loads be regulated?

2

What Does a Risk Load Do?

- Reflects the needed return on the level of capital required to support the risk assumed.
- Compensates the insurer for variance in results.
- Increases the price of the insurance product such that the supply of and demand for capital are in balance.
- Compensates for the economic inefficiency of risk concentration.

3

Papers

- For detailed discussion of risk load calculations see:
  - Shalom Feldblum:
    - "Risk Loads for Insurers"
  - Donald Mango:
    - "The Concentration Charge: Reflecting Catastrophe Exposure Accumulation in Rates"
    - "An Application of Game Theory: Property Catastrophe Risk Load"
  - Rodney Kreps:
    - "Reinsurer Risk Loads from Marginal Surplus Requirements"
  - Glenn Meyers:
    - "CME Risk Load Formula for Catastrophe Ratemaking"

4

Feldblum

- Methods of determining risk loads:
  - Standard deviation and variance methods.
  - Utility functions.
  - Probability of ruin methods.
  - Reinsurance methods.
  - Modern portfolio theory methods.
- The risk load should depend upon fluctuations in overall insurance portfolio returns.
- Based on the standard deviation of industry profit margins from 1979-1988, he concludes that personal property lines are less risky.
- Industry-wide perspective.

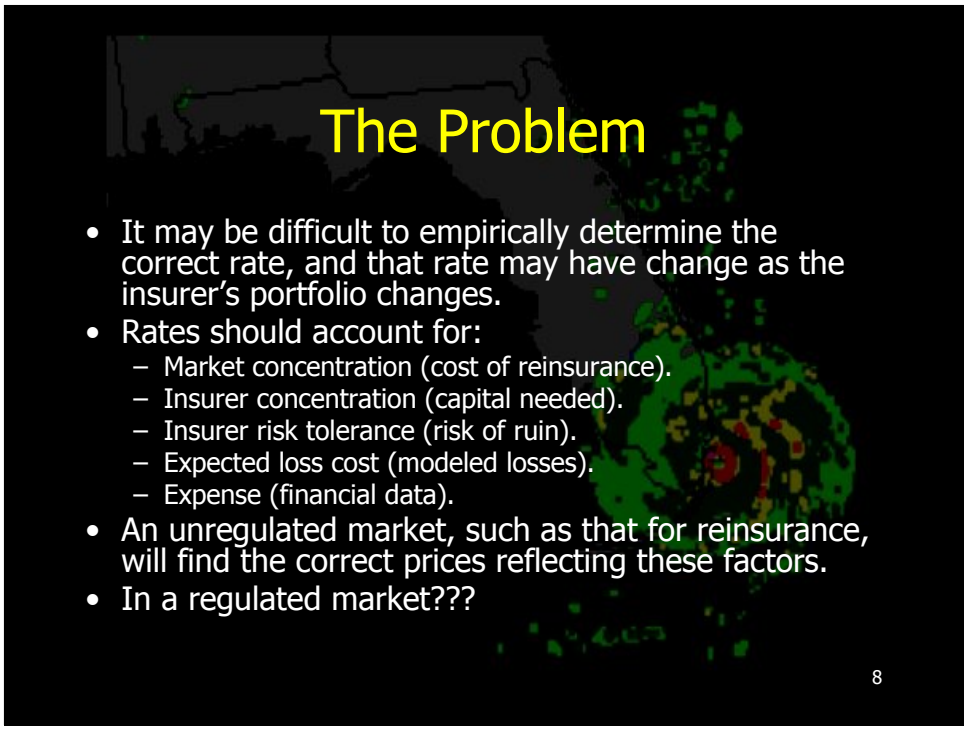
5

Mango

- Proposes "point of sale" charges based on the insurer's exposure level in area where prospective insured is located.
- Charges determined by surplus exposure.
- Insurers with higher than average concentrations would have higher rates because more surplus is exposed.
- Would drive customers to carriers which are least exposed in an area.
- Individual insurer perspective.

6


Meyers
• Key idea: "The marginal capital needed to support an insurance contract increases with concentration of exposure."
• Defines risk load as the cost of marginal capital needed to support the insurance contract.
• Under CME, risk load balances supply and demand for insurance.
• Overall, price of insurance will be higher in densely populated areas.
• Competitive market perspective.
7


The Problem
• It may be difficult to empirically determine the correct rate, and that rate may have change as the insurer's portfolio changes.
• Rates should account for:
– Market concentration (cost of reinsurance).
– Insurer concentration (capital needed).
– Insurer risk tolerance (risk of ruin).
– Expected loss cost (modeled losses).
– Expense (financial data).
• An unregulated market, such as that for reinsurance, will find the correct prices reflecting these factors.
• In a regulated market???
8

Reinsurance Cost

- Reinsurance costs are determined in an unregulated market and reflect many of these things, including:
  - Market risk concentration, trough supply and demand for coverage.
  - Insurer's concentration, through detailed modeling of the portfolio.
  - A market clearing "cost of capital".
- In primary ratemaking, reinsurance costs are often used as a proxy for more complex risk load methods, and are generally accepted by regulators.
- How can reinsurance cost be used by entities that do not purchase reinsurance?

9

A Social Perspective

Characteristic	Option A	Option B
Concentration	100 people on one island; 99 uninhabited islands.	1 person on each of 100 islands.
Expected Cost	1 out of 100 years a storm hits the inhabited island, 1 house per year.	Every year a storm hits 1 island, 1 house per year.
PML	100 houses.	1 house.
Labor and Material Reserve	100 houses.	1 house.
Idle Resources	High.	Low.
Economic Efficiency	Low.	High.
Cost of Insurance	High.	Low.
Mitigation Urgency	High.	Low.
Other Costs	Low.	High.

10

Social Considerations

- Concentration is inefficient as to the cost of rebuilding after catastrophes. It may be efficient for other reasons.
- Markets will tend to drive up insurance prices in areas of concentration due to economic inefficiency.
  - Unused construction capacity.
  - Inflation (demand surge) in loss costs after event.
- Additional growth in concentrated areas increases PML; growth in non-concentrated areas does not. The marginal cost of an additional house to the system differs due to more than loss costs!
- Economic role of insurance: reflect this cost in prices.

11

Actuarial & Regulatory Canons

- The appropriate estimate of a future rate is the current average cost adjusted for trend, or the output from a catastrophe model run on an insurer's current exposures adjusted for trend, plus some flat profit load discounted for investment income.
- Marginal Cost = Average Cost.
- The prohibition against "Unfair Discrimination" means that every similar risk written by an insurer should receive the same price.
- Prices should be adjusted periodically and based on filed rate tables calculated using formula based actuarial methodologies.

12

But In Cat Prone Lines…

- The appropriate estimate of a future rate should be based on the insurer's future distribution of risks, which may not reflect its past book of business.
- Marginal Cost ≠ Average Cost.
- Risks should be charged based on their marginal cost of capital (how much capacity they consume), which will differ for every risk based on when they enter the portfolio. Similar risks may pay different prices.
- Rates should be adjusted continuously, based on actuarially indicated rates adjusted for capacity charges.

13

Marginal vs. Average Cost

- Most actuarial ratemaking systems assume that MC = AC.
  - Needed rate on new business equals adjusted average rate on existing book.
  - This ignores:
    - Capacity charges on new writings.
    - Market driven capacity charges due to industry concentrations.
- Is this a valid assumption for catastrophe prone lines?

14

In An Unregulated World…

- Insurer determines base price based on "standard" actuarial techniques.
- Initial price reflects assumptions about the market concentration of risk and the insurer's anticipated portfolio.
- Initial insureds pay less than average price, as insurer has "excess" capacity.
- Once insurer's capacity is "full", insurer can only accept more risks at a much higher price (needed to attract more capital).
- Eventually, market will reach an equilibrium.

15

Capacity: An Airline Example

- Airline pricing reflects capacity charges.
- The airline has a fixed cost for fuel, pilots, etc., but the cost for seats varies widely.
- Passengers who book early get lower fares, passengers who book late on popular flights pay much more.
- Overall price levels have dropped significantly after deregulation.
- Is this "unfairly discriminatory"?

16

Unregulated Insurer Behavior

- Price might change based on portfolio:
  - Average rate adjusted to new capacity cost.
  - Rate fixed; new insureds pay marginal cost.
- Prices more volatile, but possibly lower on average than in a regulated market.
- Less reinsurance; more internal capital.
- Prices on average would be higher in areas of high market concentration, regardless of expected loss.
- Market characteristics:
  - No supply shortages.
  - Significant variation in price within insurer, little variation in price between insurers.

17

Regulation

- Rate regulated rates tend to be:
  - Uniform for similar risks.
  - Set over the period of the rate filing.
  - Formula, rather than auction, driven.
  - Difficult to change.
- Reinsurance costs are sometimes allowed.
- Generally, regulators lack clear standards for addressing needed risk load on internal capital.

18

Regulated Insurer Behavior

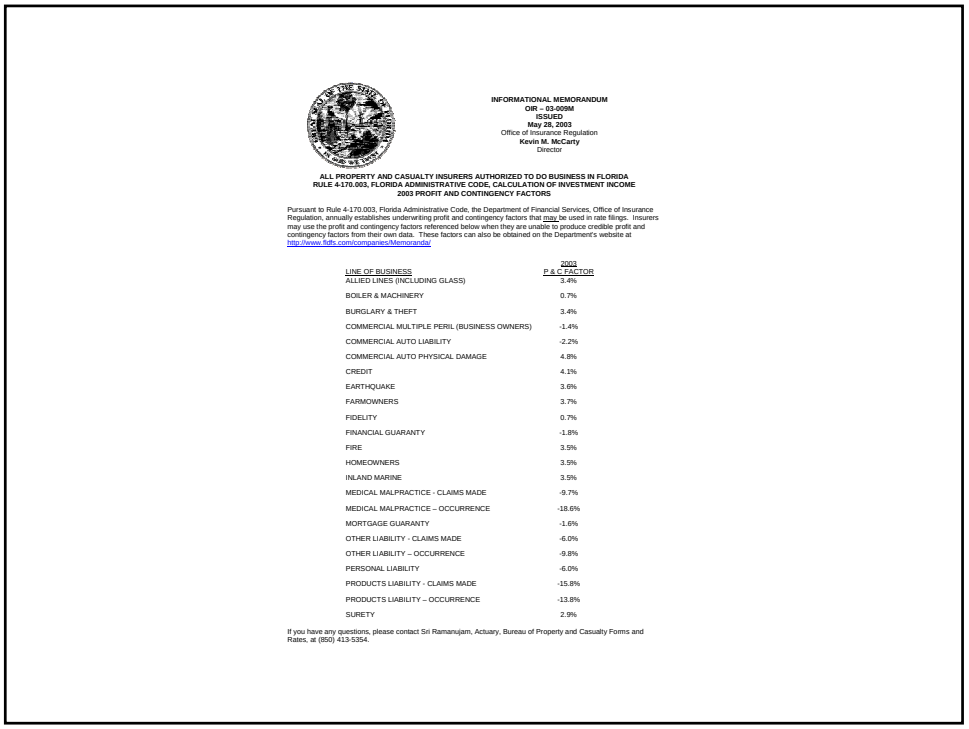
- Filed rates reflect past levels of loss exposure and risk load.
- Overall growth must be slow.
- Overuse of reinsurance; underuse of internal capital.
- Since price is fixed, quantity is the variable that can be adjusted. Strict concentration controls are necessary to fit within pricing constraints.
- Market characteristics:
  - Supply shortages.
  - No variation in price within insurer, large variation in price between insurers.

19

Current Florida Practice

- Modeled loss costs are being allowed.
- "Reasonable" reinsurance costs are allowed.
- Profit factor is based on 5% allowance less difference between investment income discount between physical damage and line in question.
- Risk load is challenged; some rates reflect risk through negotiation or arbitration.
- Effect: insurers are not fully compensated for exposing their own surplus.

20



INFORMATIONAL MEMORANDUM
OIR – 03-009M
ISSUED
May 28, 2003
Office of Insurance Regulation
Kevin M. McCarty
Director

ALL PROPERTY AND CASUALTY INSURERS AUTHORIZED TO DO BUSINESS IN FLORIDA
RULE 4-170.003, FLORIDA ADMINISTRATIVE CODE, CALCULATION OF INVESTMENT INCOME
2003 PROFIT AND CONTINGENCY FACTORS

Pursuant to Rule 4-170.003, Florida Administrative Code, the Department of Financial Services, Office of Insurance Regulation, annually establishes underwriting profit and contingency factors that may be used in rate filings. Insurers may use the profit and contingency factors referenced below when they are unable to produce credible profit and contingency factors from their own data. These factors can also be obtained on the Department's website at http://www.fldfs.com/companies/Memoranda/

LINE OF BUSINESS	2003 P & C FACTOR
ALLIED LINES (INCLUDING GLASS)	3.4%
BOILER & MACHINERY	0.7%
BURGLARY & THEFT	3.4%
COMMERCIAL MULTIPLE PERIL (BUSINESS OWNERS)	-1.4%
COMMERCIAL AUTO LIABILITY	-2.2%
COMMERCIAL AUTO PHYSICAL DAMAGE	4.8%
CREDIT	4.1%
EARTHQUAKE	3.6%
FARMOWNERS	3.7%
FIDELITY	0.7%
FINANCIAL GUARANTY	-1.8%
FIRE	3.5%
HOMEOWNERS	3.5%
INLAND MARINE	3.5%
MEDICAL MALPRACTICE - CLAIMS MADE	-9.7%
MEDICAL MALPRACTICE – OCCURRENCE	-18.6%
MORTGAGE GUARANTY	-1.6%
OTHER LIABILITY - CLAIMS MADE	-6.0%
OTHER LIABILITY – OCCURRENCE	-9.8%
PERSONAL LIABILITY	-6.0%
PRODUCTS LIABILITY - CLAIMS MADE	-15.8%
PRODUCTS LIABILITY – OCCURRENCE	-13.8%
SURETY	2.9%

If you have any questions, please contact Sri Ramanujam, Actuary, Bureau of Property and Casualty Forms and Rates, at (850) 413-5354.

Example

	Auto	Direct HO	Reins. HO
E(x)	1,000,000	1,000,000	100,000
PML	1,500,000	10,000,000	600,000
Capital Req.	500,000	9,000,000	500,000
Cost @10%	50,000	900,000	50,000
Reins. Cost	0	0	2,310,000
Needed Rate	1,050,000	1,900,000	2,460,000
Allowed Rate	1,050,000	1,050,000	2,460,000
Allowed ROE	10.0%	0.6%	10.0%

Assumes no expenses and no investment income.

Reins. Cost for reinsured example = E(ceded loss) + (15% * Capital). Higher due to frictional costs.

22

Bond Market Analogy

- "Junk" bonds pay higher yields because they represent a greater risk of default.
- Suppose a regulator forced all bonds to yield the "T-Bill" rate.
  - No one would buy high risk bonds.
  - Regulator might form a "residual bond fund" that would buy bonds unable to secure coverage in the voluntary market and assess (tax) holders of T-Bills to cover deficits.
  - Risky behavior would be encouraged.

23

Risk Load Alternative

- Allow insurers to file for a "profit factor" for hurricane based on the standard deviation of their net losses times a scaling factor (k) that could be based on a market-wide analysis.
- Similar to method used by some reinsurers.
- System would self-correct for level of reinsurance.
  - More reinsurance, lower μ and σ, lower load.
  - Less reinsurance, higher μ and σ, higher load.
  - Fully reinsured would equal current load.

24

Calculating the Load

- Run 10,000 year storm set.
- Calculate reinsurance recoveries for each event:
  - FHCF.
  - Private Reinsurance.
- Calculate net loss after reinsurance for each event.
- Calculate μ and σ for net losses.
- Hurricane rate = μ + kσ + expense + cost of reinsurance.
- Same dataset could be used to allocate risk adjusted rates to territory.

25

Advantages

- Provides regulators with a tool to test insurer risk loads:
  - Accounts for reinsurance and FHCF.
  - Is mechanical, as is discounting for investment income.
  - Can be audited.
- Only one parameter needs to be estimated, (k).
- Provides a way to test for a "reasonable" profit factor for internally generated capital.
- Provides an incentive for insurers to expose capital.

26

Limitations

- Standard deviation is not "state of the art".
- Does not directly take marginal cost of capital into account.
- k has to be estimated:
  - Residual market reinsurance.
  - Cost of capital for similarly risky industries.
  - Implicit cost of capital for FHCF through expected debt financing costs.

27

Conclusions

- Traditional actuarial primary ratemaking practices and rate regulation paradigms are fundamentally at odds with economic reality in catastrophe prone lines.
- The market has developed a system of rationing to respond to these constraints.
- There are opportunities for regulators to lower prices and increase availability by modernizing how risk loads are reflected in rates.

28

Questions Revisited

- Can risk loads be empirically determined or are they a function of investor utility?
- Are risk loads "static"?
- Do they depend on the market portfolio, the insurer's portfolio, the insurer's management risk tolerance, or is the correct load independent of these factors?
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29

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30