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Emerging Risks... Daring Solutions



Institute of Actuaries of India

Some Aspects of P&C Retail Pricing

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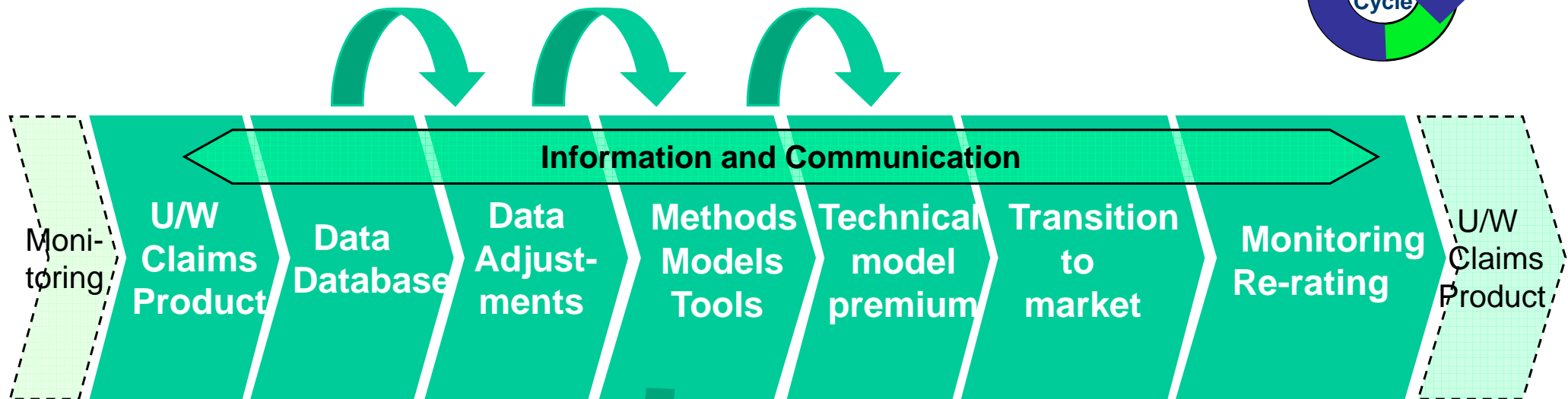
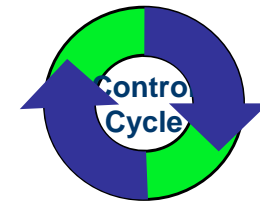
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Germany



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Pricing Cycle – an actuarial key process



Issues to consider

<ul style="list-style-type: none"> Product features History Rate adjustment U/w guidelines Reserving policy Customer group 	<ul style="list-style-type: none"> updated internal external relevant plausible grouped reconciled complete timeline 	<ul style="list-style-type: none"> Product-changes deductibles large losses small / nil claims run-off/ultimate inflation exposure 	<ul style="list-style-type: none"> risk variables risk segmentation univariate multivariate interaction Stochastic volatility goodness-of-fit u/w expertise 	<ul style="list-style-type: none"> market position competitors target group portfolio impact implementation overall level expense allocation cross-subsidization costing vs market premium 	<ul style="list-style-type: none"> frequency level of detail items business plan profitability criteria communication re-rating / adjustments initiate new cycle
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Note: The process is generally not linear; iterations tend to occur.

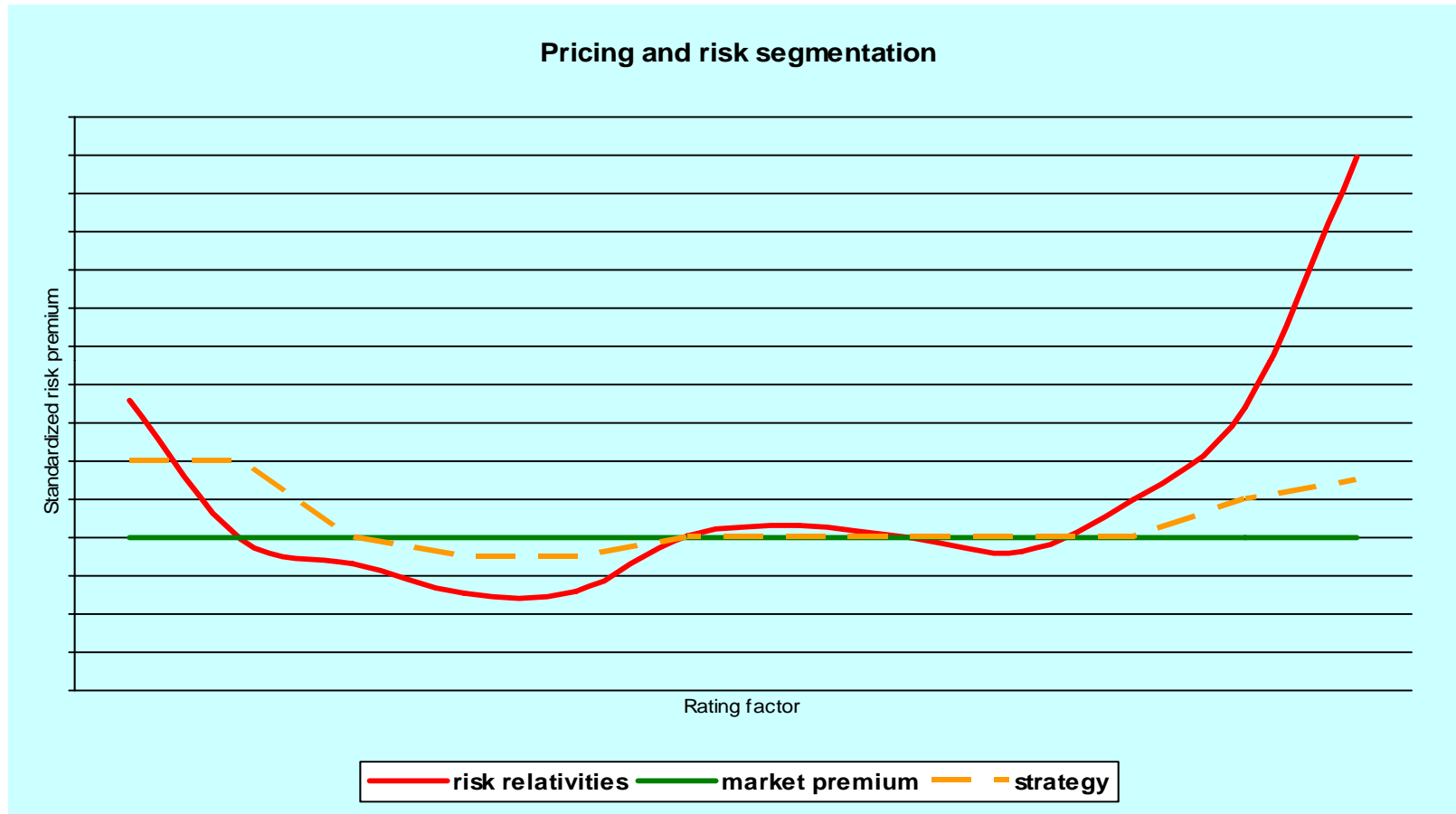
The Technical Premium - cornerstone of a sound pricing approach

$$\text{Technical Premium} = \left\{ \begin{array}{l} \boxed{\text{expected value of future claim payments}} \\ + \\ \text{(future) expenses} \\ \text{(commission, administration, tax, profit)} \\ + \\ \text{contingency / fluctuation loading} \\ \text{(risk of random, error, change)} \end{array} \right.$$

Insurance risks:

- **Random risk:** large losses, accumulation risk
- **Risk of error:** calculation error, stress of competition
- **Risk of change:** economical trends, legislation, portfolio mix

Pricing – more than pure premium calculation



- Risk relativities and overall premium level
- Risk segmentation and pricing - isn't it the same issue ?
- “loss cost modelling” vs. market price management

Data quality and accuracy is key

“The statistician is no longer an alchemist expected to produce gold from any worthless material offered him. He is more like a chemist capable of assaying exactly how much of value it contains, and capable also of extracting this amount, and no more. In this circumstances, it would be foolish to commend a statistician because his results are precise or to reprove because they are not. If he is competent in his craft, the value of the result follows solely from the value of the material given him. It contains so much information and no more. His job is only to produce what it contains”

R. A. Fisher

Summary: “garbage in, garbage out”

What kind of data and data sources are available ?

Possible Data Sources

- Policy information, existing tariffs, rating and underwriting criteria
- Additional internally available data (e.g. other LoB, sister company, ..)
- Grouped or consolidated statistical data could be possibly useful
- Questionnaire, sample survey

- Availability of proper external data like Industry wide data collection schemes, market premium rating structures, statutory return statistics, research body statistics etc.

External data have their benefits

- May have little or no data in some segments
- Internal data may be unsuitable, unreliable
- Lack of critical mass
- Need a benchmark to evaluate own data
- More efficient data gathering
- May be legally obliged to quote in new segment with little or no data

...and their limitations

- Questionable quality of reported figures
(it is what you deliver...)
- Data may be more heterogeneous arising from company variation in target markets, product types, U/W & admin, data systems & coding
- Usually less detailed, less flexible, more out of date and of less uniform quality than internal data
- May be legal restrictions on use of data

Setting Up a Pricing Database

Is all loss data useful ?

- Matching policy information, i.e. corresponding to risk data
- Time shift / age of data: claims inflation, underlying terms and conditions
- Scope of cover, limits und deductibles, excess level and retention
- Problem of large losses, catastrophes
- Issue of (very) small losses, losses below deductible
- Split between payments and reserves; reserve setting practice ?
- Claims development and run-off: ultimate loss amount known ?
- Insurance cycle effects / processing bottle-necks
-

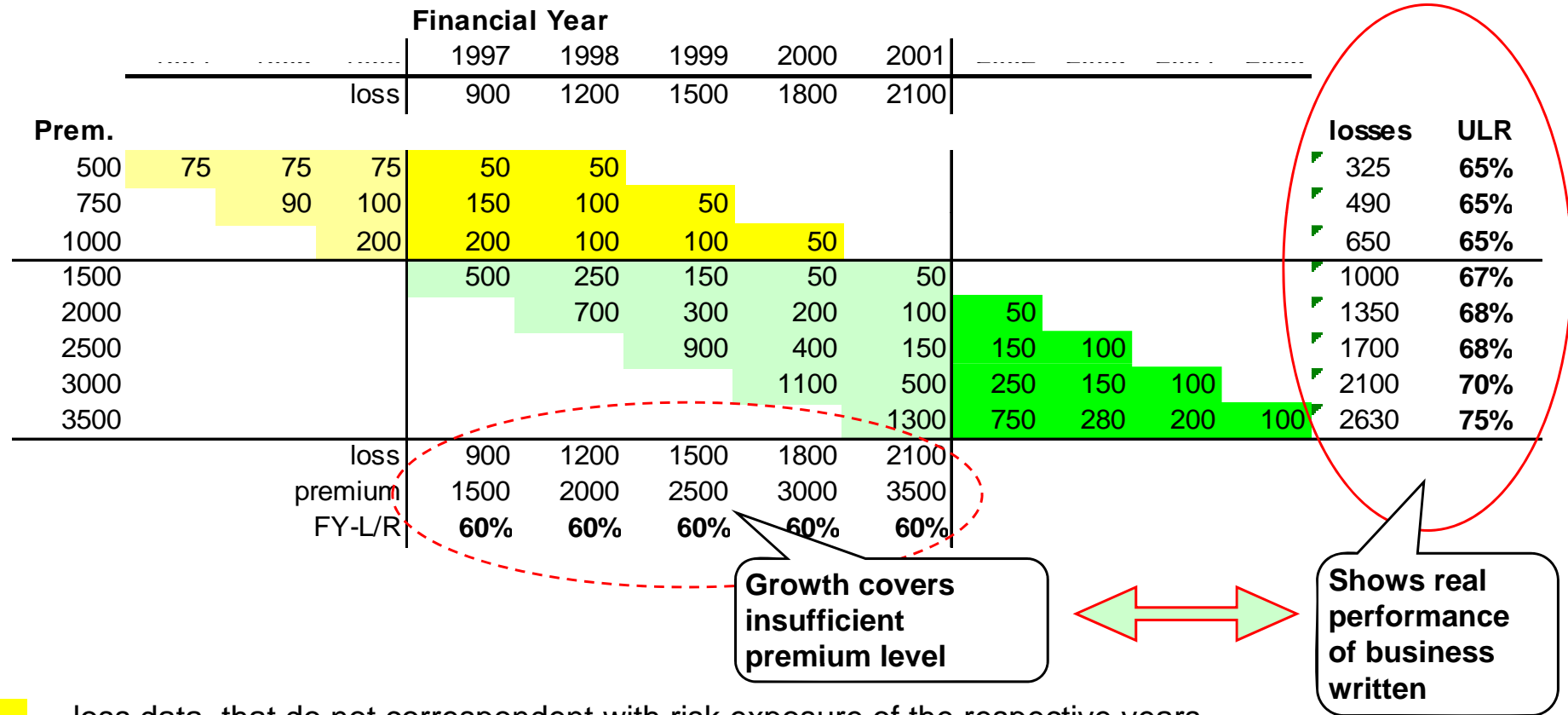
Building a loss cost model requires adequate (historical) data, i.e. data that is

- clean
- complete
- verified
- sufficient
- meaningful

Check, if data adjustments are necessary

Financial year data often distort view on actual performance

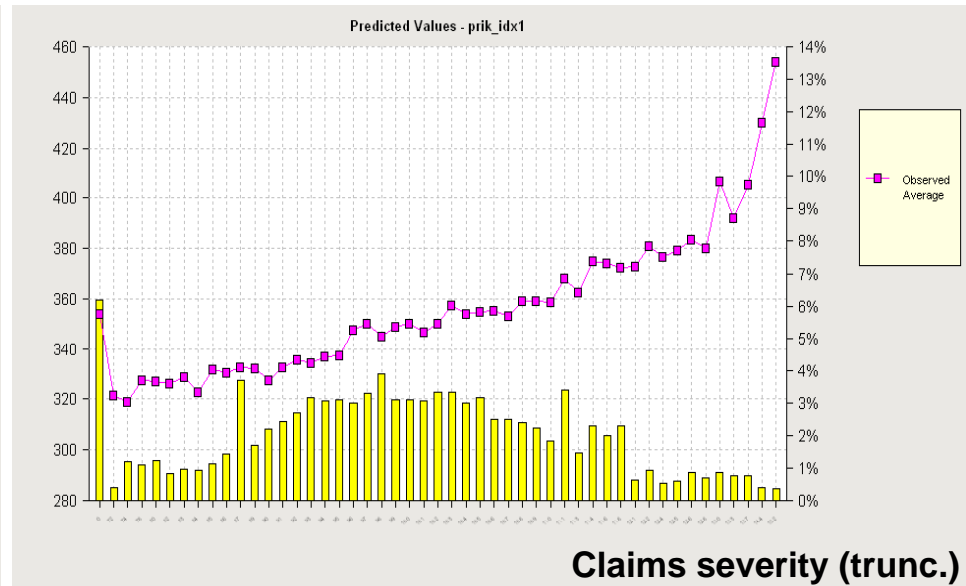
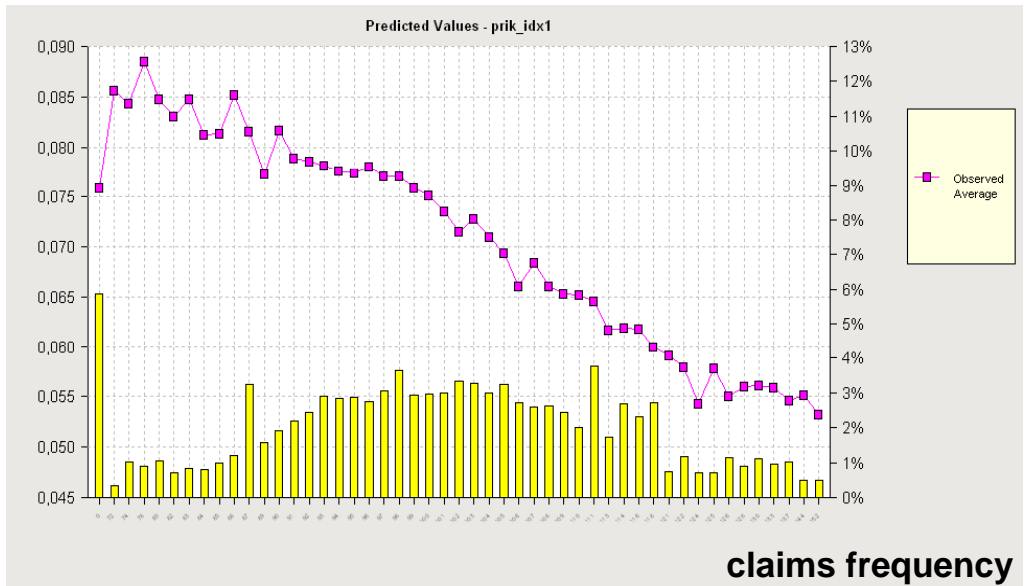
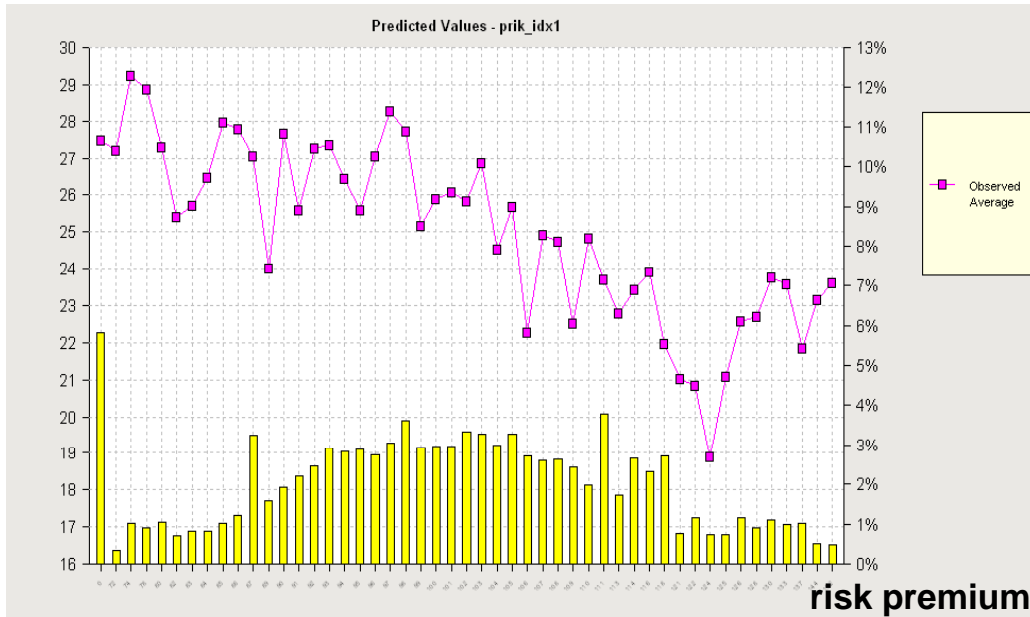
Calendar Year Statistics do not suit Pricing Purposes properly



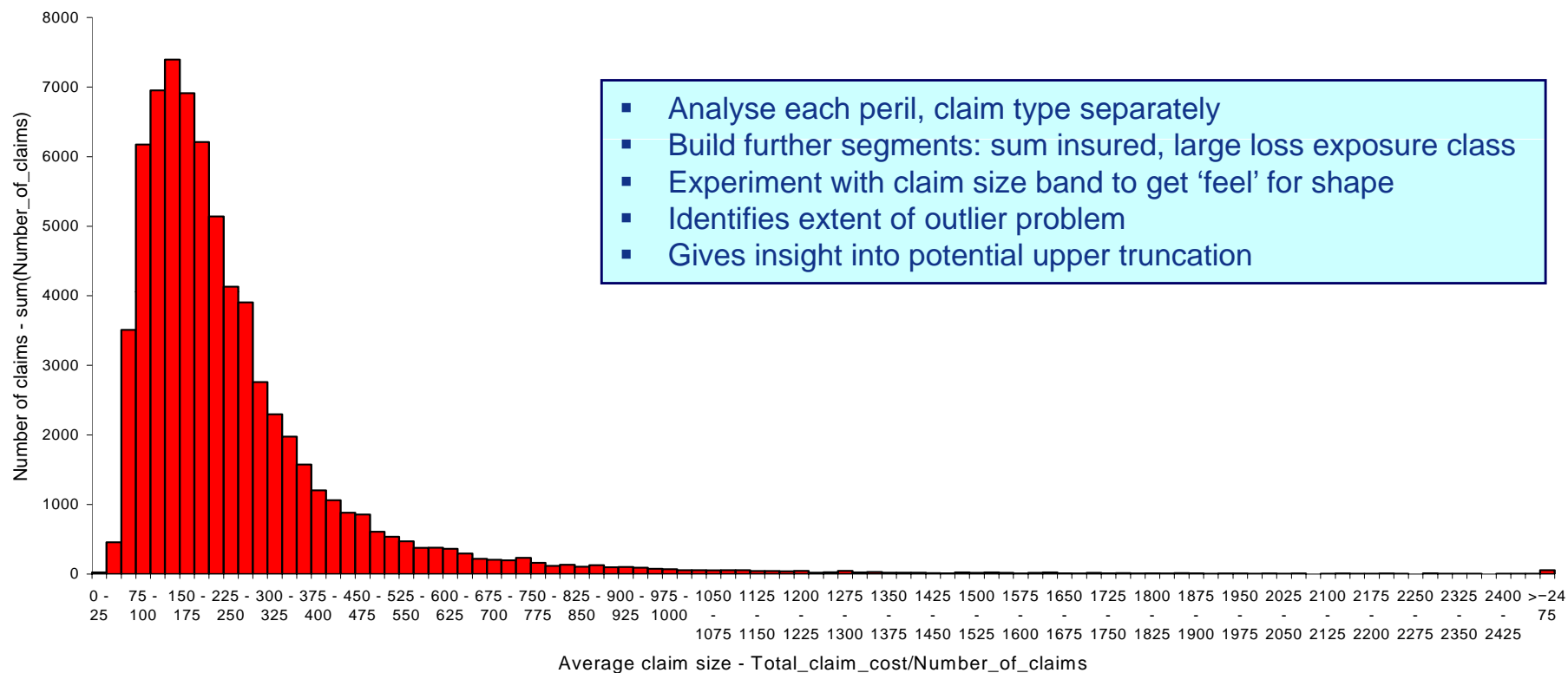
- loss data, that do not correspondent with risk exposure of the respective years
- loss data, that correspondent with risk exposure of the respective years, but not known yet

Separate models for frequency and severity

Very often basic trends and dependencies are more obvious and therefore easier to model, when looking into claims frequency and claims severity data separately



Claim Size Distribution – large losses



- Analyse each peril, claim type separately
- Build further segments: sum insured, large loss exposure class
- Experiment with claim size band to get 'feel' for shape
- Identifies extent of outlier problem
- Gives insight into potential upper truncation

- **Usually average claim size distributions have a significant positive skew**
- **Potential solution is to split the distribution in two - i.e. top slice & model each section separately:**
 - **Either assume propensity for large claims not dependent on risk factors**
 - **or assume propensity for large claims is dependent on risk factors**

Technical Premium - to cover all your expenses, not only loss costs:

Starting from the (net) risk premium - add on:

Loadings (to the risk premium)

- Large losses
- fluctuation loading
- Future claims inflation

Tariff Discounts

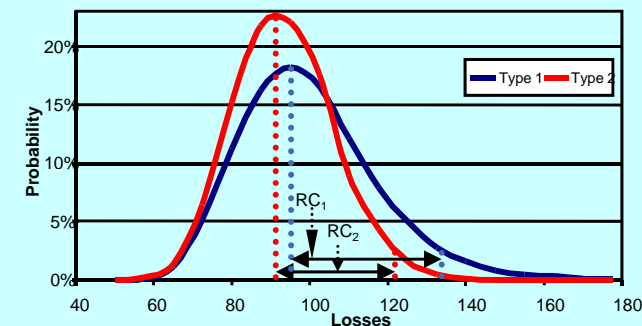
- for your 100% - premium

Expenses

- Some policies are more expensive to administer ?
- Don't forget LAE - explicitly load handling costs by claim type
- May handle all claims & get recovery from insured ?
- Reinsurance costs

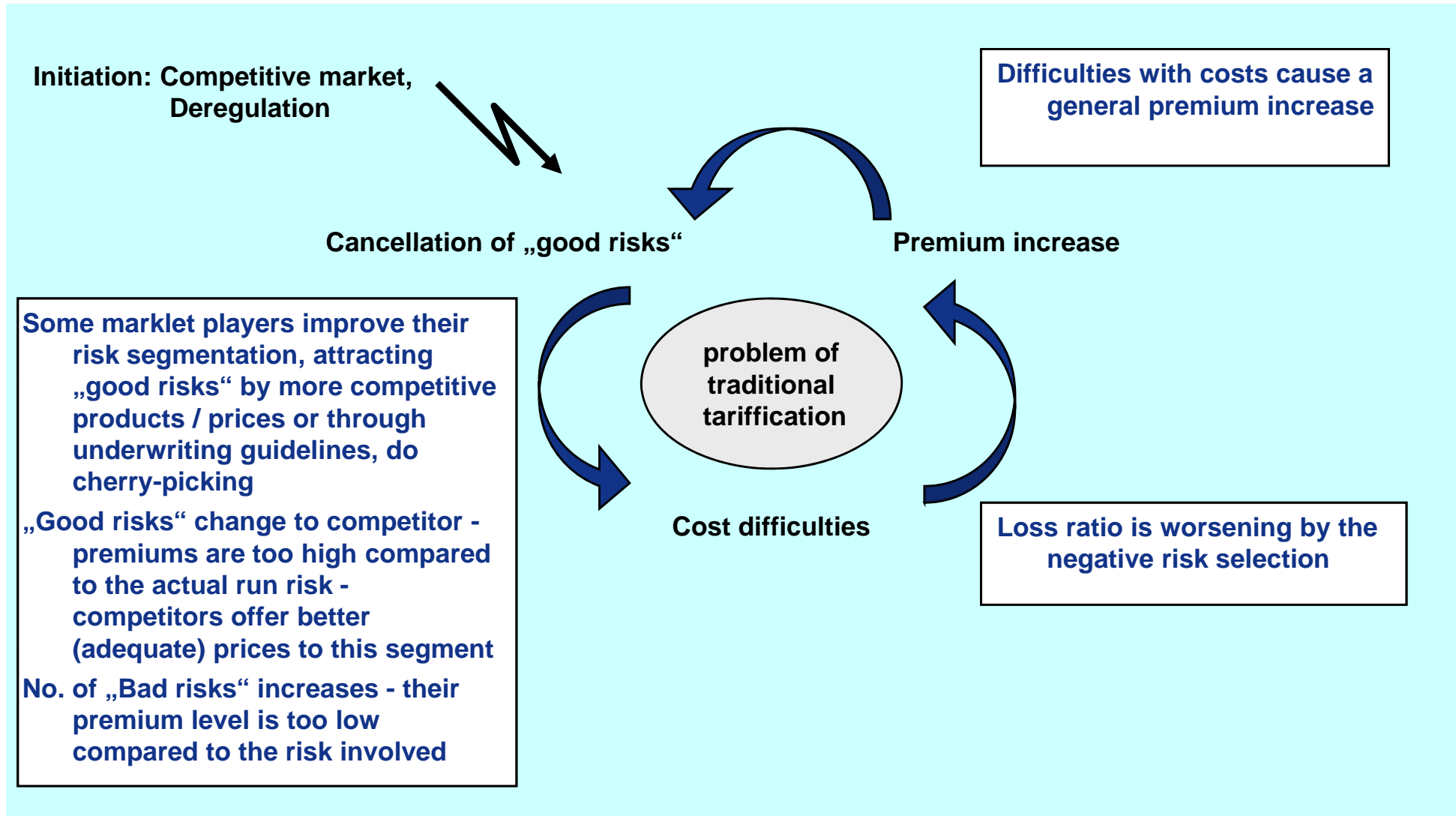
Commissions

Profit / "something" for cost of risk capital

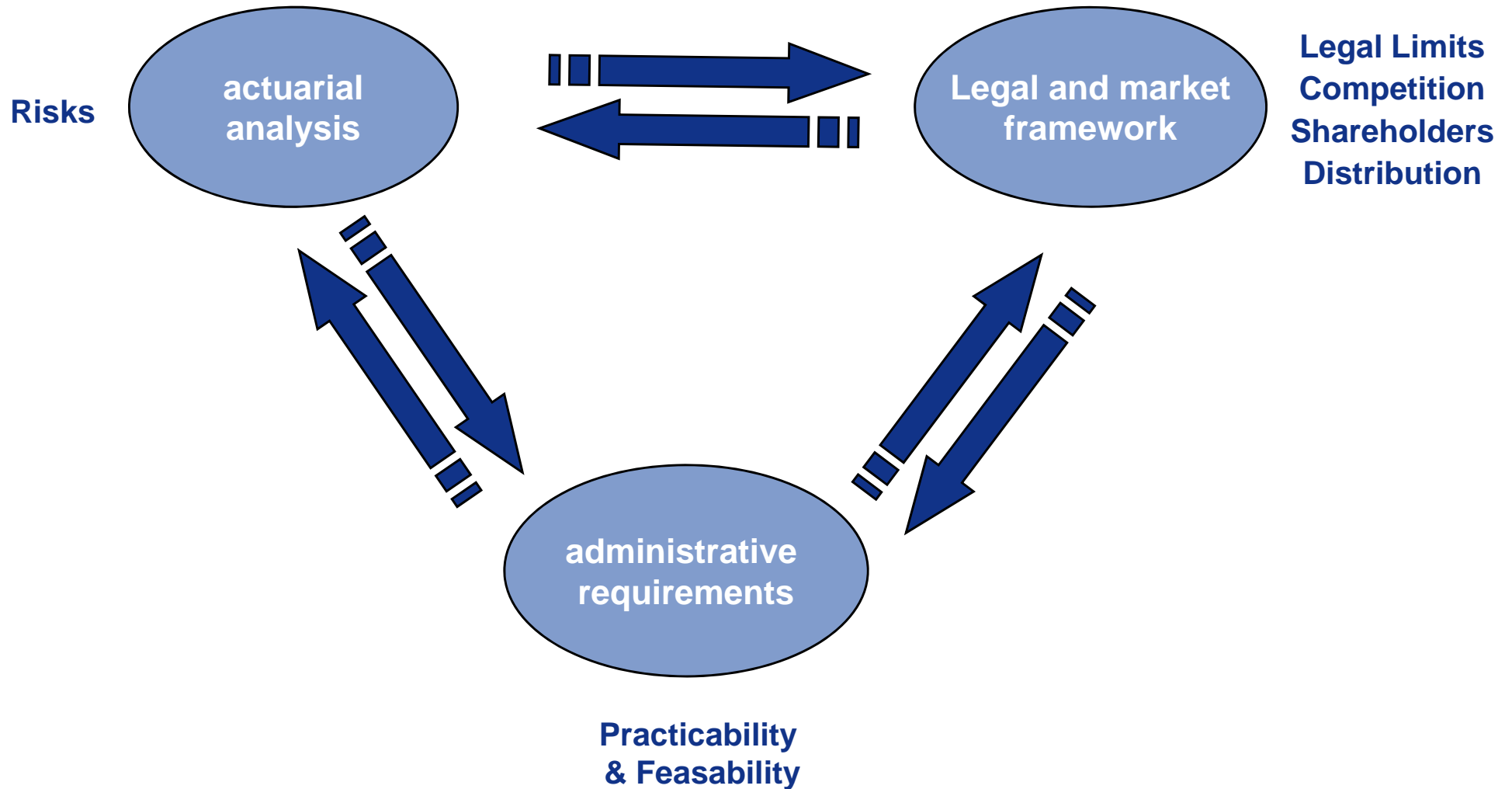


Why risk segmentation ?

If you do not select, others will select against you



Risk analysis and pricing – a geared process to balance conflicting areas

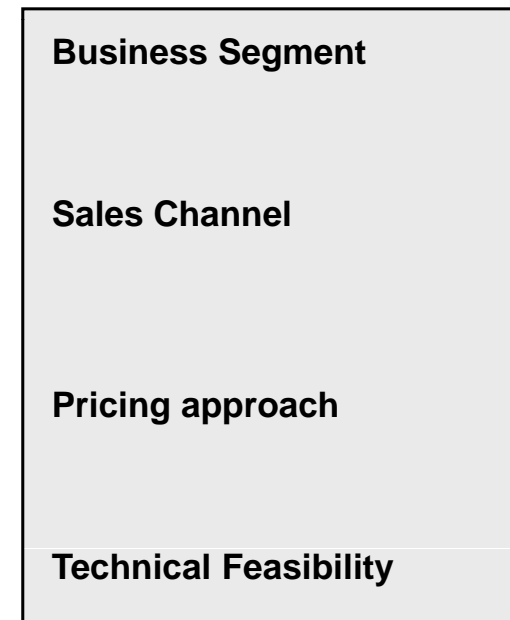
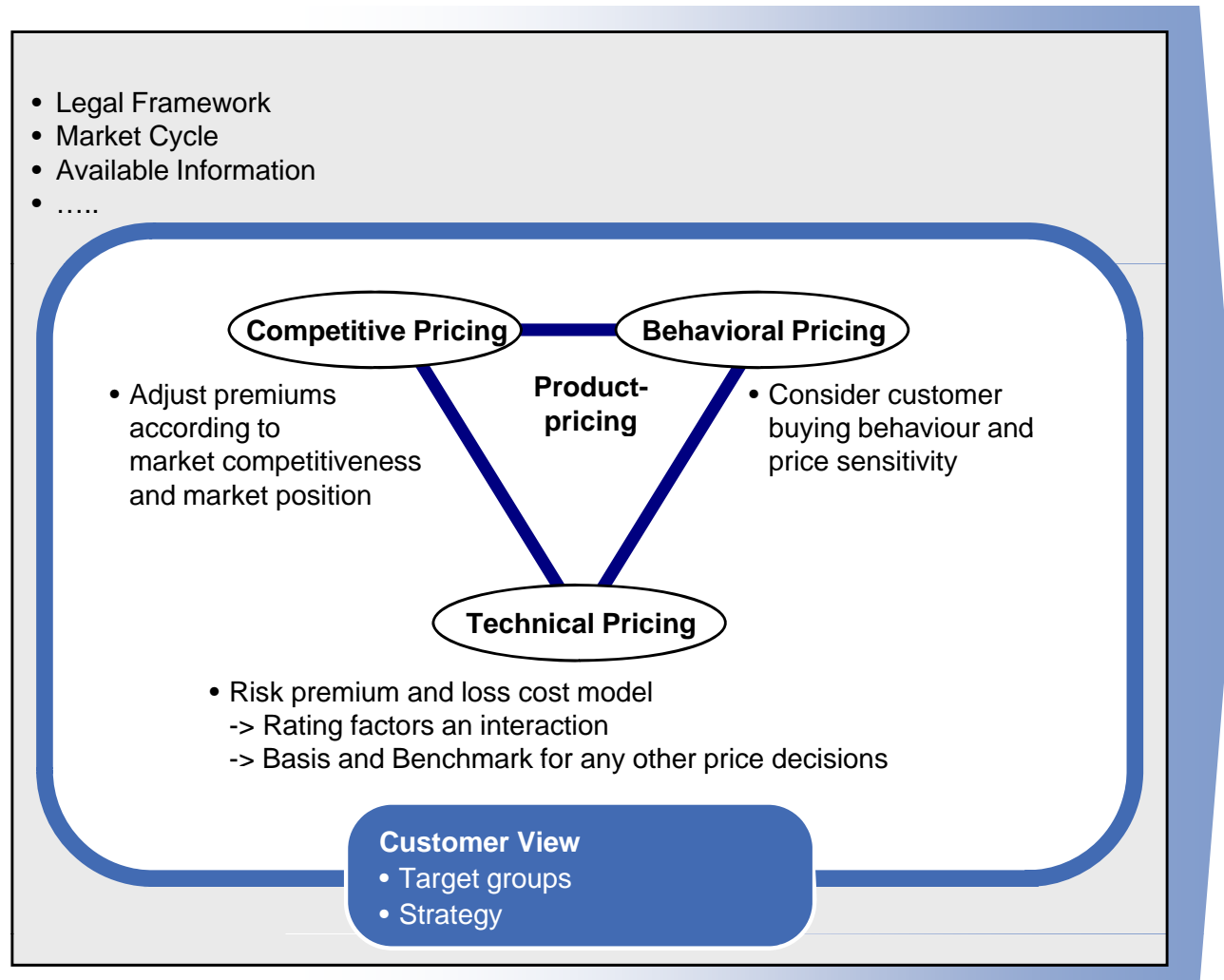


Pricing – more than pure premium calculation

Take all pricing components into account before final pricing decision

Pricing Framework

Price Implementation



Rule No.1: Communicate - talk to the Underwriter

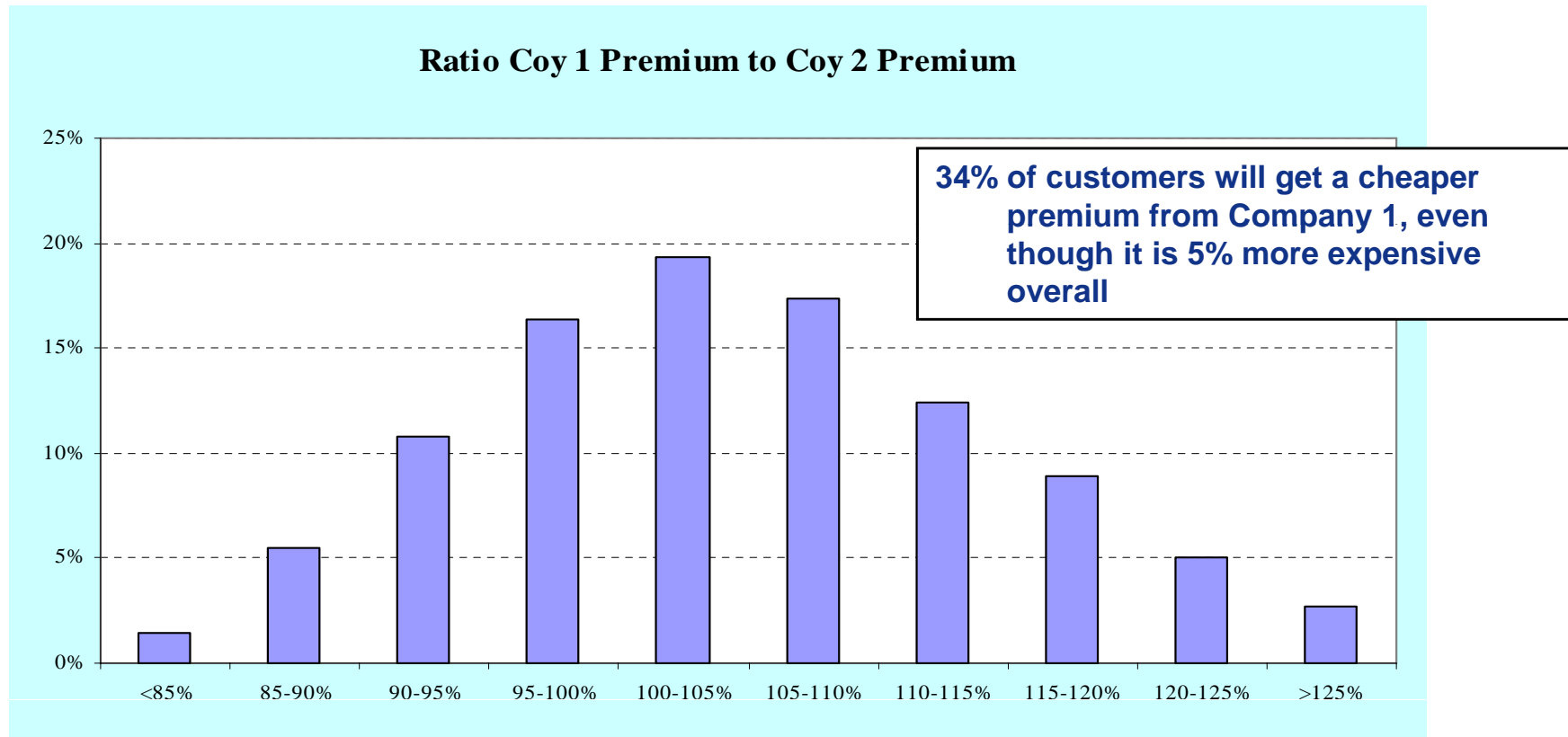
„We have no doubt that an underwriter’s ‘gut feeling’ will always be important in the pricing decision: however it is one thing to think you know, another to know you know.“

[M. J. Brockmann, F.I.A. and T.S. Wright]

- **Utilise expertise of both to the full potential**
- **Clarify with the underwriter about changes:** mix, policy conditions, environment,...
- **Adjust model for any distortions**
- **Allow for commercial considerations**
- **Be aware of “language issues”, e.g. about rate level change: “5% increase” means**
 - **to the actuary**: expected total premium would be 5% higher, given the current portfolio mix
 - **to the salesman**: everybody has to pay 5% more
 - **to the controller**: next year we will have a 5% increase in total premium income
 - :

“We are uncompetitive....” - evaluate your market position in more detail

Example of premium comparison - Summary



Lesson: When someone tells you your rates are too expensive, don't necessarily take their word for it. Do a market sample, if you can!

Aspects to set commercial rates

Price dynamics in the market

- frequency of market monitoring
- markets mis-price risks sometimes and present “arbitrage” opportunities

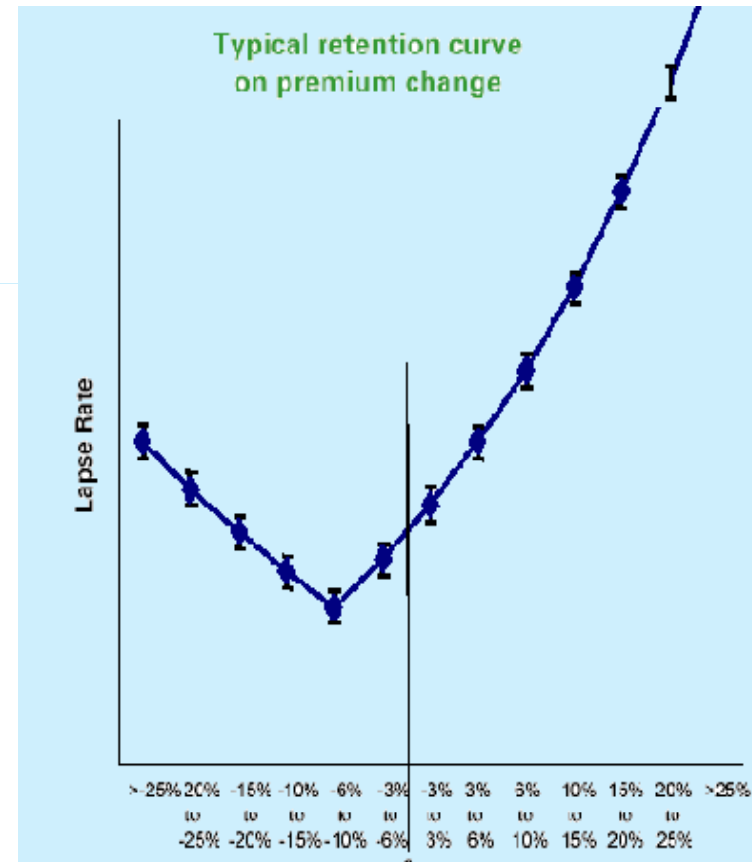
Intensity of competition

- understand competitors’ pricing behaviour
- don’t ignore price dispersion in the market

Consider customer behaviour, which is not always rational

Do our prices and products fit well with our distribution channels and systems?

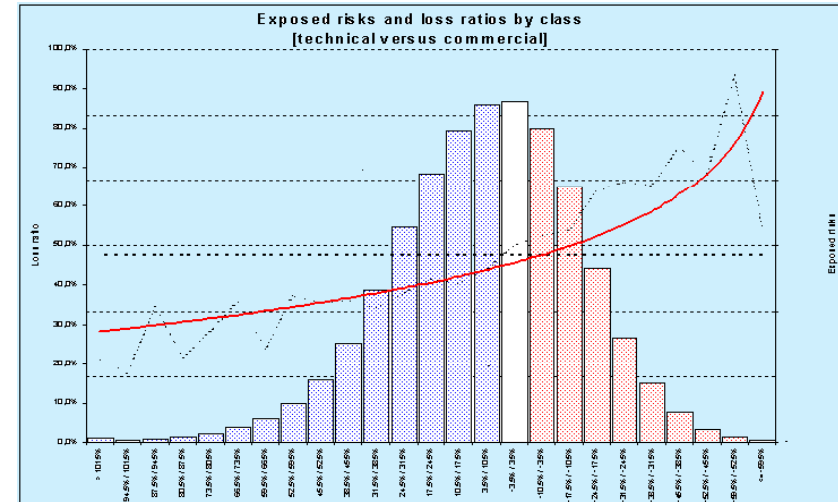
Intelligent pricing over the cycle



Actuarial responsibility does not end with technical rates

Actuary's task list:

- **Derive technical tariff**
 - absolute level
 - relative levels
- **Compare current tariff to technical**
- **Quantify (commercial) decisions and cross-subsidies**
- **Analyse impact on both, portfolio (renewals) and on new business**
 - market view - don't forget competitors
 - evaluate your market position
 - forecast future portfolio mix and premium impact
 - profit test
- **Documentation of rationale of pricing decisions**
- **Think about proper monitoring and reporting statistic and procedure**



Setting up regular monitoring statistics and procedures

Monitoring statistics should contain

- number of contracts, sum insured,..
- number of risk years ("earned exposure")
- average premium, earned premium
- loss amount (paid and reserved, incl. IBNR)
- number of claims
- loss ratio, loss frequency, average loss
- benchmark (e.g. plan, market,....)
- technical, commercial, actual premium
- ...

And should be separated by:

- products, product generations
- rating factors like make of car, model,....
- sales channel
- any specialities
- ...

Regularly test and control - check with your plan

- **Overall level to assess profitability:**
 - based on ultimate loss costs
 - considering impact of large losses
- **Portfolio mix:**
 - identify „cross-subsidies“ and adverse selection in your tariff
 - balance of B/M system / bonus hunger
- **Risk relativities:**
 - significance, consistency
 - frequency / severity

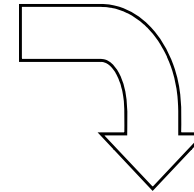
=> to check portfolio distribution, profitability and business plan possibly initiate more detailed analysis

Portfolio Mix - Don't misunderstand trends

Example: missing out migration into higher NCD classes leads to misinterpretation

Year 0

bonus/malus class	stand. contracts	net risk
1	750	701,00
2	250	234,00
Total	1.000	584,25



year 1

bonus/malus class	stand. contracts	net risk	change of net risk %
1	500	750,07	7,0
2	500	250,38	7,0
Total	1.000	500,23	- 14,4

=> Underlying claims trend can easily be covered by change in portfolio mix

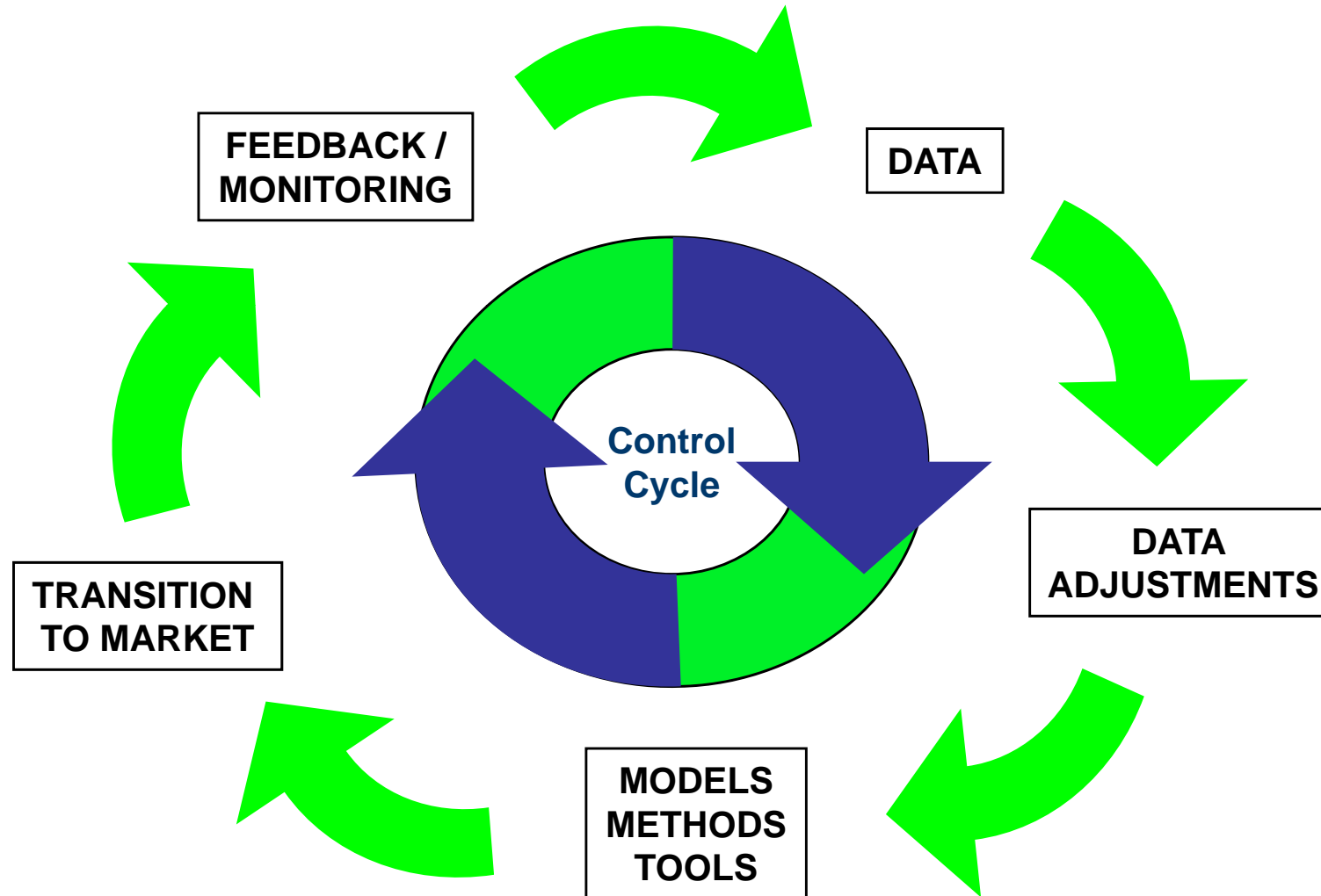
Inconsistent statistics could mask real risk performance
 ... in particular, if portfolio grows (or shrinks) considerably

Example: Company grows by 10% per quarter

Product: 70% loss ratio
 respective loss reporting delayed by 1 quarter

	Quarter of reporting year				Quarter of reporting year +1			
	I	II	III	IV	V	II	III	IV
Written premium	1000	1100	1210	1331	1464			
Earned premium out of 1.q	125	250	250	250	125			
out of 2.q		138	275	275	275	138		
out of 3.q			151	303	303	303	151	
out of 4.q				166	333	333	333	166
					183	366	366	366
								183
Earned premium	125	388	676	994	1218		
Losses	0	88	271	473	696	853	
<u>Reported</u> quarterly L/R	0%	8%	22%	36%	48%		
Written premium ytd	1000	2100	3310	4641	1464		
Earned premium ytd	125	513	1189	2183	1218		
Losses ytd	0	88	359	832	696	1548	
Reported L/R ytd	0%	17%	30%	38%	57%		
required IBNR IBNR	88	271	473	696	853		
IBNR as % of NEP	70%	53%	40%	32%	70%			
Performance L/R	70%	70%	70%	70%	70%		

Pricing is a continuous process



Role of the Actuary in this process


Recommend pricing decisions to management....

- **Foundation is technical competence**
 - Data collection, verification and correction
 - Technical analysis of claims experience
 - Analysis of rating factor effects and interactions
- **Transparent assumptions regarding**
 - Expenses (including cost of reinsurance)
 - Investment income
 - Theoretical profit loading, derived from transparent assumptions regarding required capital and return on capital
- **Communication with management is a ‘two-way street’**
 - Listening is the hardest skill to develop – but essential; Need to hear all sides of the story
 - work with, but think independently of management/sales/underwriting
 - be willing to face own mistakes
- **Allow for commercial considerations**
 - Competitive pressures and price elasticity
 - Likely impact on ability to meet sales targets

Role of the Actuary in this process

... and provide management with greater understanding of

- **Consequences of pricing decisions, past, current and future**
 - Likely outcome or “central estimate” and range of possible outcomes,
 - Risks and realistic best / worst case scenarios (eg probable maximum loss)
- **Limitations of pricing**
 - sometimes there is inadequate data,
 - sometimes the risk is, in effect, not insurable
- **Ways in which risks can be managed**
- **Drivers of profit and performance against targets**
- **Performance relative to plan/forecast/target**

 **Role of actuary is to substitute facts for impressions**