



Institute of Actuaries of Australia

Premium Rating in Motor Business: an international perspective

Rob van Horssen, Gen Re

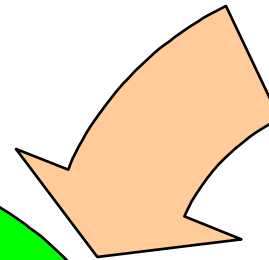
30 August / 2 September 2004



My own actuarial control cycle...

- are we getting the results we were expecting?

Monitoring



Reserve analysis

- how much do we pay in the future on past claims?

Portfolio analysis

- how is the business performing?

Segmentation analysis

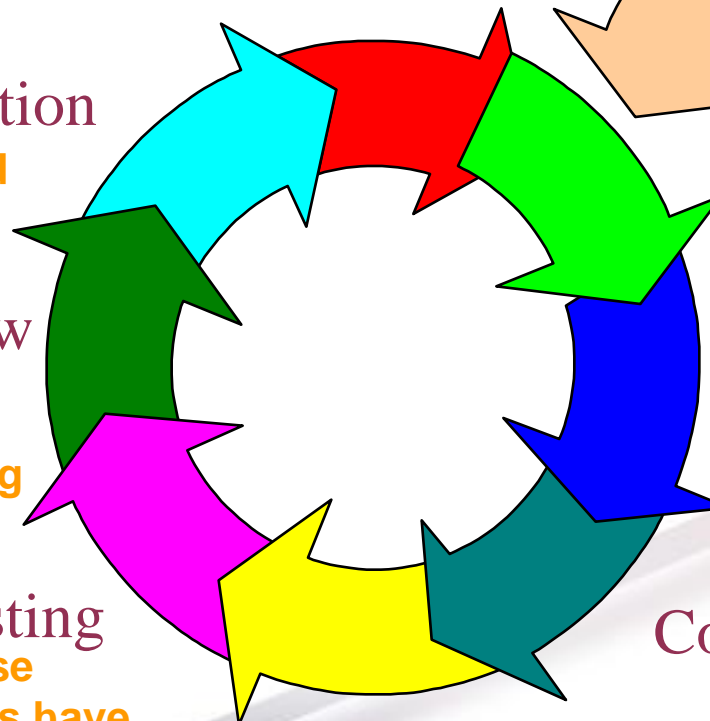
- which clients are profitable and which are unprofitable?

Competitor analysis

- where are competitors more expensive and where cheaper?

Management actions?

- what actions can potentially be taken?



Implementation

- taking quick and flexible action

Pricing and u/w guidelines

- decision making

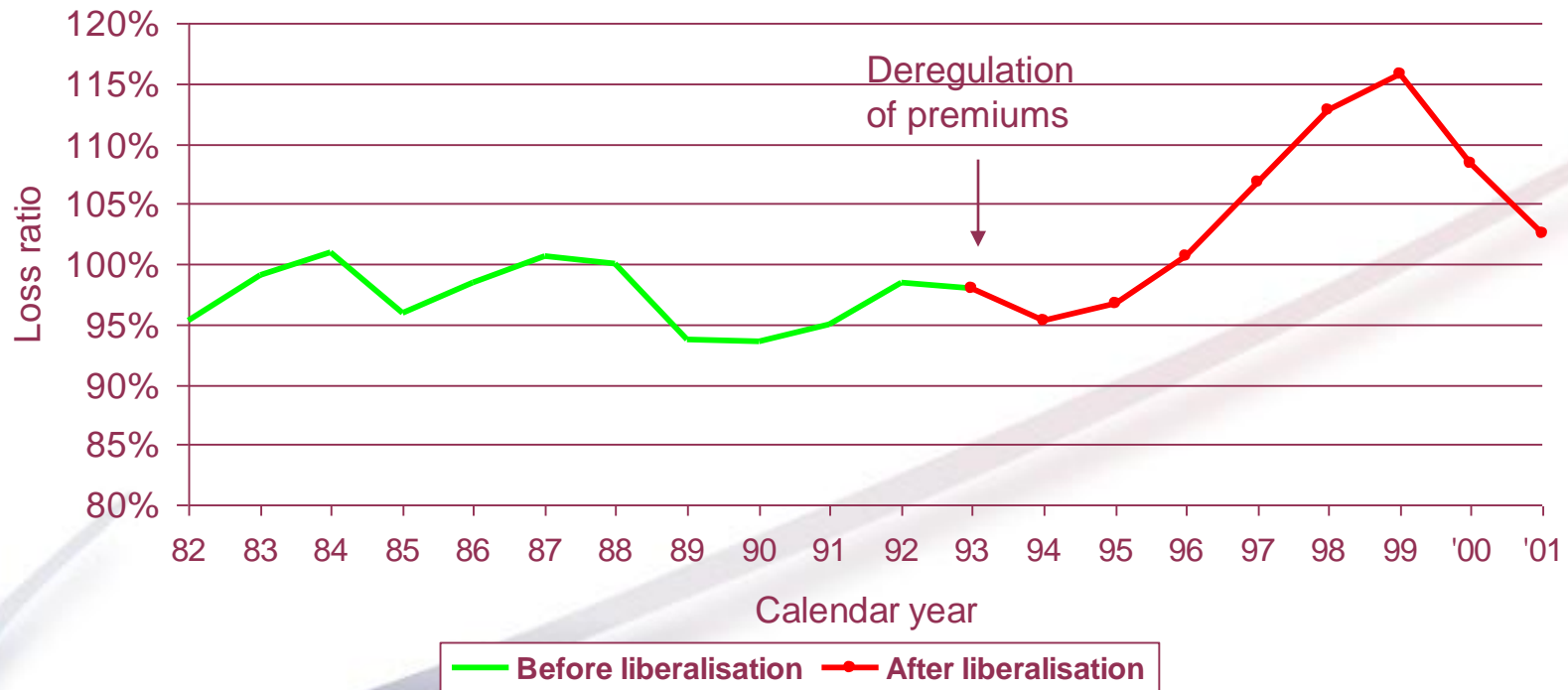
Profit testing

- what effect do these management actions have on volume, profitability, business mix



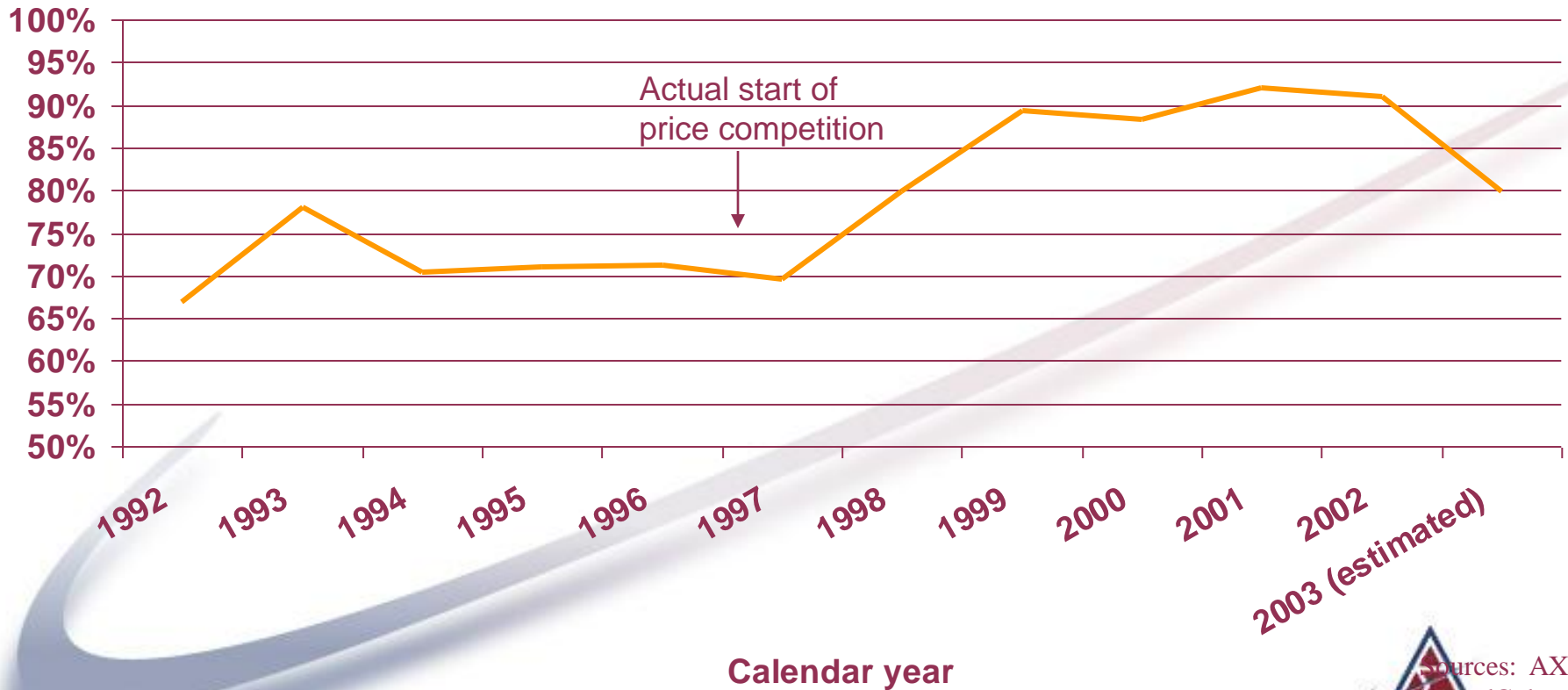
Motor insurance profits in Germany showed a disastrous trend after premium liberalisation

loss ratios TPL



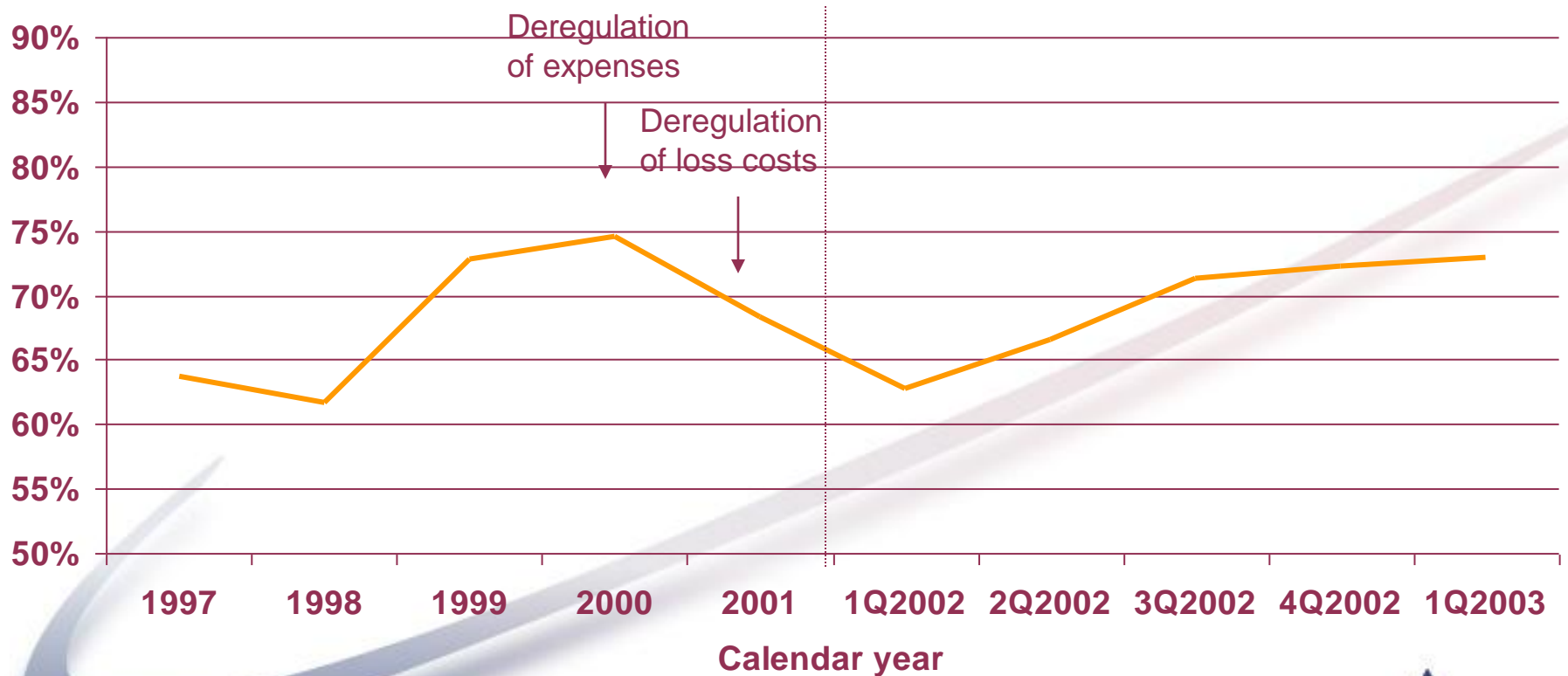
In Singapore, motor insurance profits are finally recovering

Loss ratios Motor



In Korea, loss ratios are climbing fast

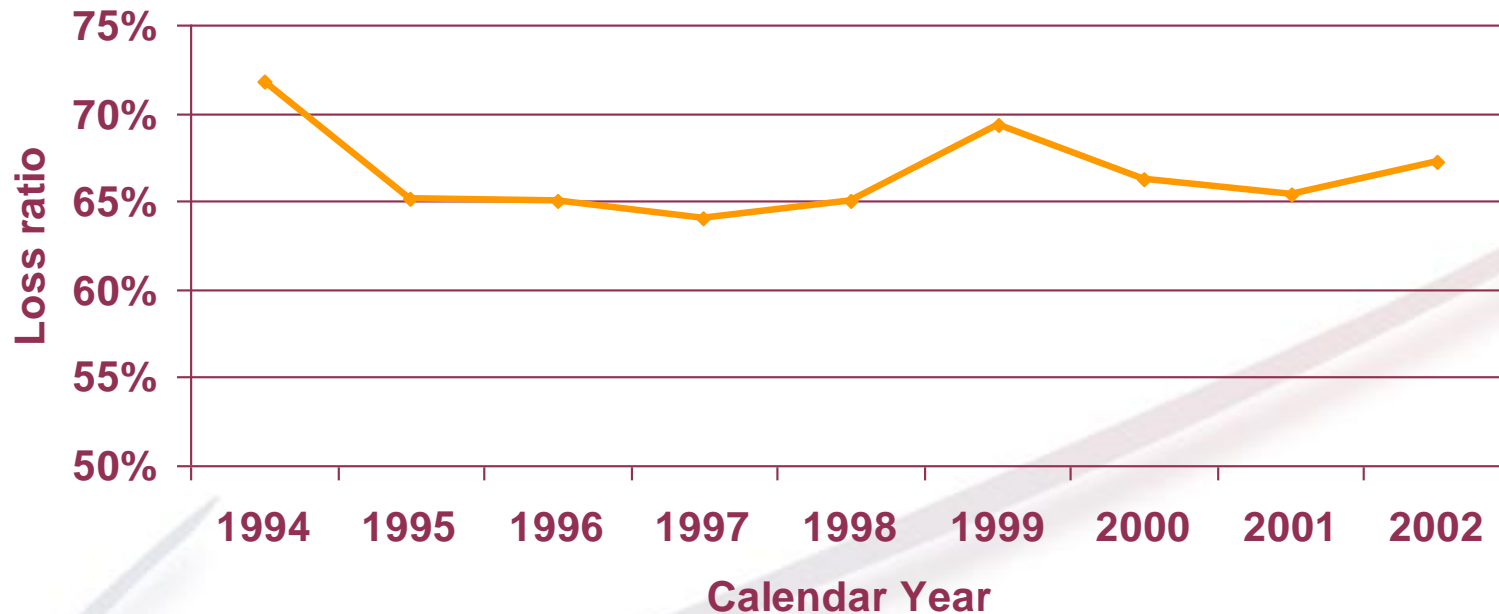
Loss ratios Motor



Source: KIDI

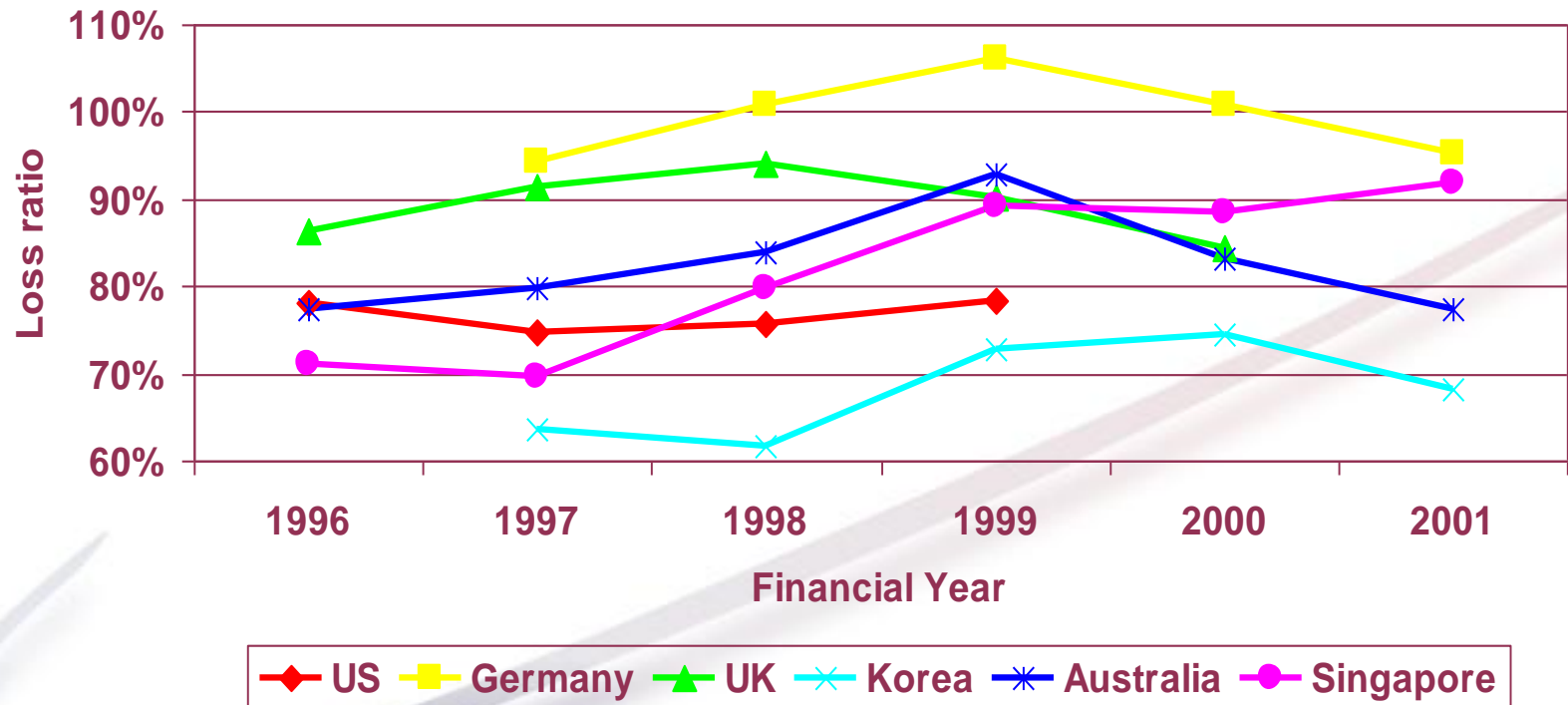
In Malaysia (regulated market), results in Motor are relatively stable

Loss ratios Motor



Motor insurance in general is a very competitive market

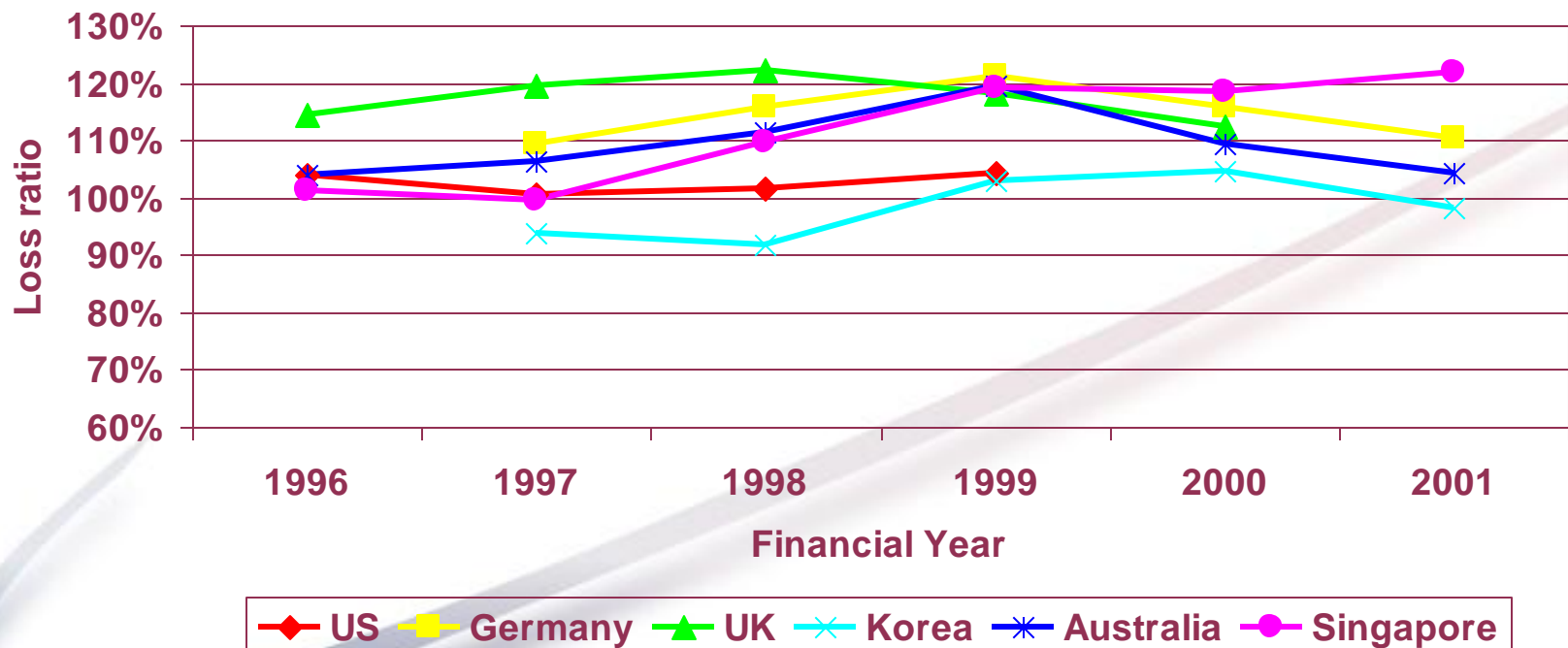
Motor Loss ratios of analysed countries



Sources: AIA, GDV, MAS, NAIC

Motor insurance in general is a very competitive market

Estimated Motor combined ratios for analysed countries

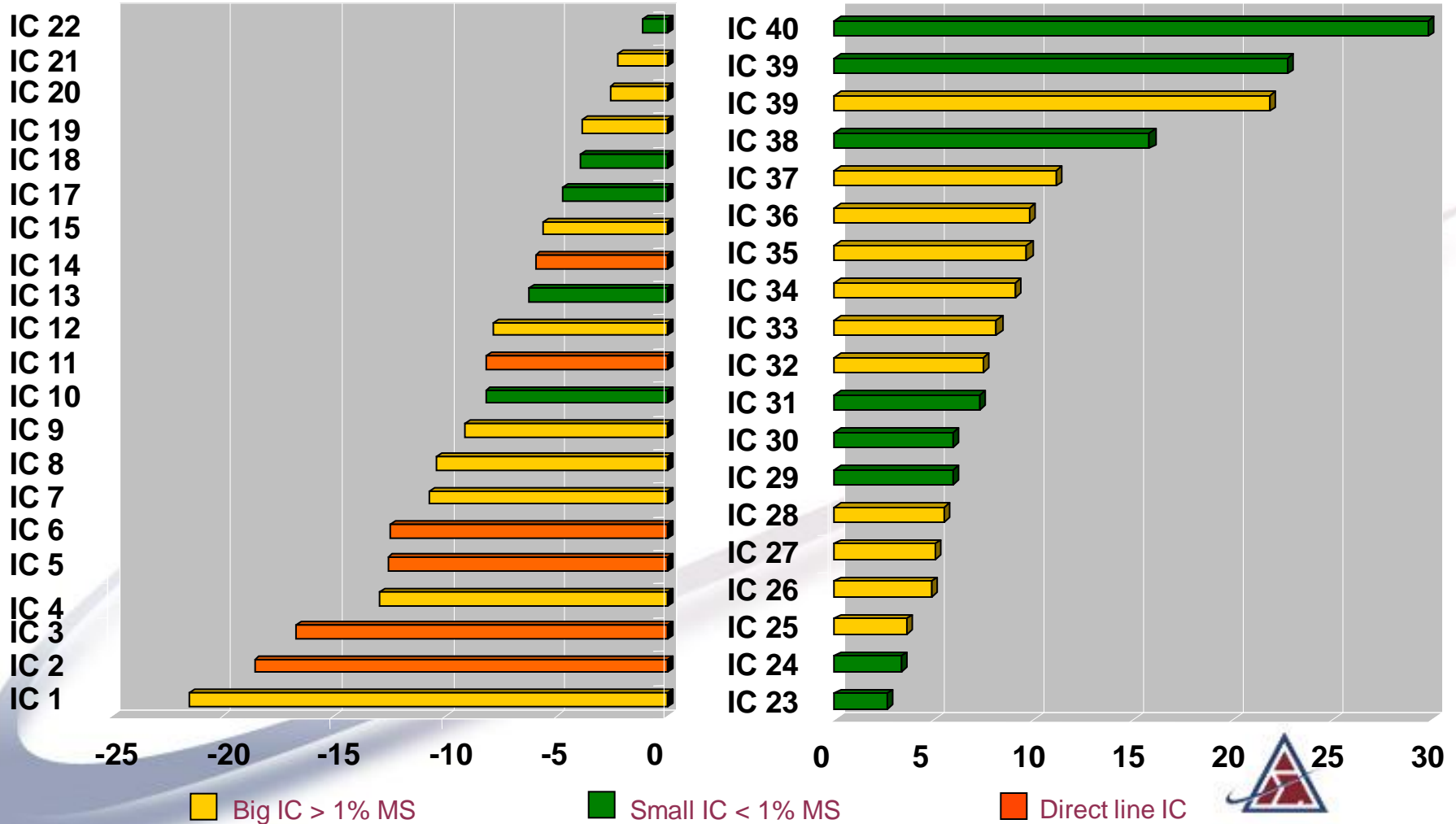


Note: Total expense ratio of 30% assumed for Korea

Sources: AXCO, GDV, MAS, MIA, Korean Yearbook

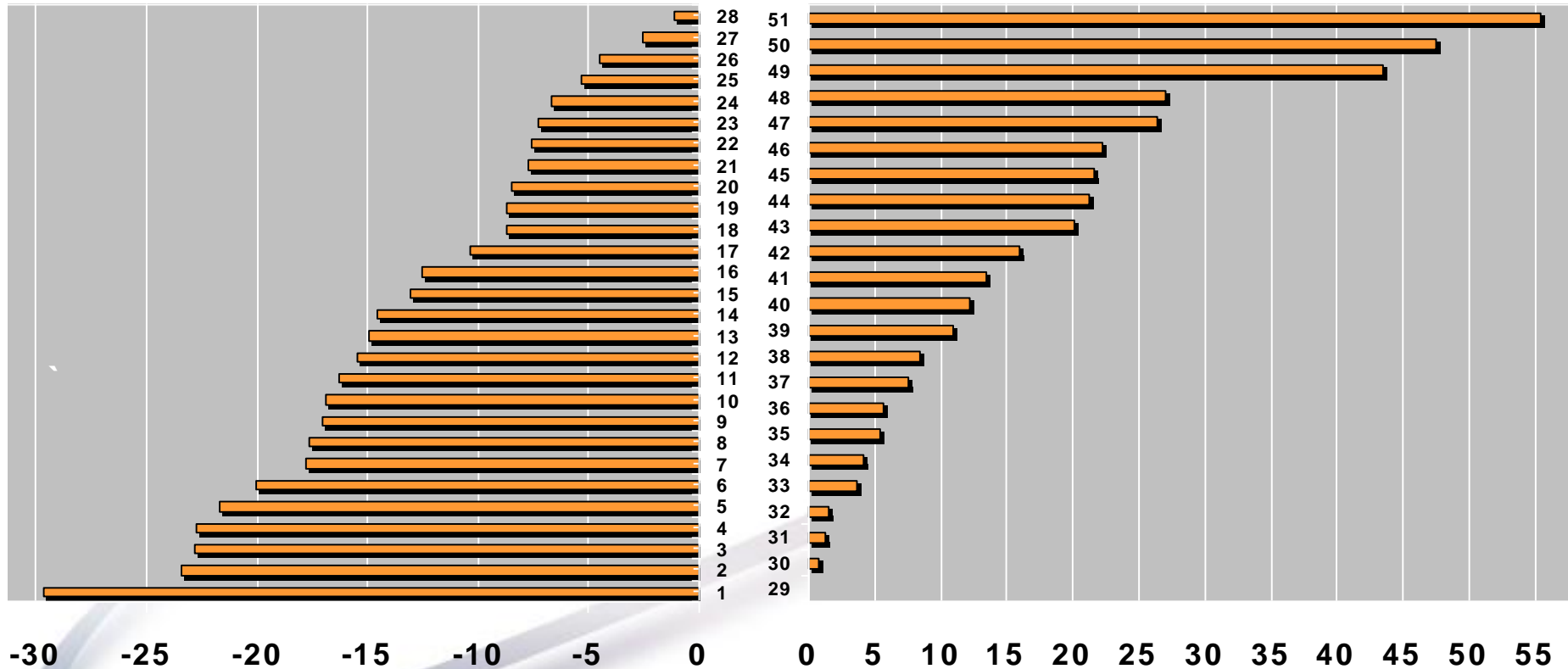
Premiums per company can differ widely within a country, as is shown in Germany

MTPL: Market average = 395.95 €



In the US, there are large premium differences between the 51 states

Market average = US\$ 773



Quiz...

The company's value is ultimately a result of

- A. What management likes to hear
- B. What the CIRC likes to hear
- C. The volume of the business
- D. The premium rate
- E. A control of loss costs & management expenses, in combination with the right premium rate ✓

E is the best option for all parties involved: shareholders, policyholders, employees and supervisory authority

Can we copy foreign premium structures into China?

I will look at:

- Are covers the same?
- Are the same risk characteristics being used?
- Are the NCD systems the same?

(Other areas:

- Are deductibles and limits the same?
- Are legal systems the same?)

➤ **Can we see premium differences between countries?**



Coverages around the world are essentially the same, though they are built up in a different way

	country													
	US	Germany		UK			Korea		Australia			Singapore		
Passenger Accident	under Medical	PA		TP	TPFT	Comp	CALI	Excess BI	CTP			TP	TPFT	Comp
Third Party Bodily Injury	Bodily Injury	TPL					TPPD	TPPD	TPFT	Comp	TPFT			
Third Party Property Damage	Property Damage	POD	FOD	OD	Gap insurance	Uninsured Motorist cover						Gap insurance	Free car hire	Towing & recovery
Fire	Comp						Collission	Uninsured and Underinsured	Free car hire	Towing & recovery	Mech. Breakdown			
Theft		Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery						Mech. Breakdown		
Own Damage - NonCollission	Comp						Collission	Uninsured and Underinsured	Free car hire	Towing & recovery	Mech. Breakdown			
Own Damage - Collission		Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery						Mech. Breakdown		
Gap insurance	Comp						Collission	Uninsured and Underinsured	Free car hire	Towing & recovery	Mech. Breakdown			
Uninsured motorist		Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery						Mech. Breakdown		
Car rental	Comp						Collission	Uninsured and Underinsured	Free car hire	Towing & recovery	Mech. Breakdown			
Towing & Labor		Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery						Mech. Breakdown		
Medical payments	Medical						Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery		Mech. Breakdown	
Mechanical Breakdown		Comp	Collission	Uninsured and Underinsured	Free car hire	Towing & recovery						Mech. Breakdown		

Note: Green areas are compulsory

Sources:  multiple websites

Overall premium differences are not that great

	country									
	US	Germany		UK		Korea	Australia		Singapore	
Year	2002	2000		2002			2001		2002	
Passenger Accident				47	0			207		
Third Party Bodily Injury	111	249			-				210	250
Third Party Property Damage	99							221		
Fire						503				580
Theft										
Own Damage - NonCollision	113	92	299							
Own Damage - Collision	238									
Personal Injury	132									

Notes: Green areas are compulsory;
some figures are estimated, all in
4/2003 Euros

Sources: AXCE, IASO, several reports



Risk characteristics used – Insured's characteristics

		country					
		US	Germany	UK	Korea	Australia	Singapore
Insured's characteristics	age	x	x	x	x	x	x
	gender	x	x	x	x	x	x
	marital status	x					
	residential address / region	x	x	x		x	
	occupation		x	x			x
	driving experience			x	x	x	x
	credit rating	new		some			
	NCD		x	x		x	x
	garage-owner		x				
	other insurance products bought	x	x			x	
	done driver training	x					
	good student	x					
	non-smoker/non-drinker	some				alcohol only	
	other vehicles					x	
	% use of vehicle					x	
	convictions				x		x
	loss history	x				x	x

Source: multiple websites



Risk characteristics used – Vehicle characteristics

		country					
		US	Germany	UK	Korea	Australia	Singapore
Vehicle characteristics	age		x	x		x	x
	make	x	x	x		x	x
	model	x	x	x		x	
	capacity				x		x
	sum insured				x	x	old
	year of purchase		x				
	type of car	x				x	some
	safety features	x			x		
	vehicle security					x	
	metallic paint y/n					x	
	existing damage					x	
	number of cars	x					

Risk characteristics used – Other characteristics

		country					
		US	Germany	UK	Korea	Australia	Singapore
Other	use	x	x	x	x	x	some
	number of drivers		x	x		x	
	annual mileage	x	x	x		x	
	actual vehicle usage	being tested		Norwich Union			
	liability limit		x				
	goods carrying y/n					x	
	driven to work y/n					x	
	additional accessories					x	
	distribution channel				x		
	type of finance					x	

NCD systems differ greatly between countries

Cover	country											
	US	Germany			UK		Korea		Australia		Singapore	
		TPL	POD	FOD	All		All		All		All	
Malus							300%					
M4		245%					260%					
M3		230%					220%					
M2		155%		190%			180%					
M1		140%		115%			140%					
0	(none)	100%	(none)	100%	100%	100%	100%		100%	100%	100%	100%
1		85%		90%	70%	100%	90%		80%	100%	90%	100%
2		70%		80%	60%	100%	80%		70%	100%	80%	100%
3		60%		70%	50%	70%	70%		60%	80%	70%	100%
4		55%		65%	40%	60%	60%		50%	70%	60%	90%
5		55%		60%	35%	50%	50%		40%	60%	50%	80%
6		50%		55%	35%	40%	40%					
7		50%		50%	35%	40%						
8		45%		45%	35%	40%						
9		45%		45%	30%	30%						
10		45%		45%								
11		40%		40%								
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Comparison of premium rate differentials

The material presented here is based on publicly available information from selected insurance providers in respective countries. They do not necessarily represent the current situation, nor what companies actually charge. Further, there may be structural differences when other base assumptions are chosen. This analysis should only be used to give a broad indication of differences within factors and between companies.

Comparisons made

1. Comparison of 3 companies within the following countries
 - US
 - Germany
 - UK
 - Australia
 - Singapore
2. Comparison across countries



Rating criteria compared

Driver characteristics

- Gender
- Insured Age
- Marital Status
- Driving Experience

Vehicle characteristics

- Vehicle Make
- Vehicle Age
- Vehicle night parking location
- Mileage
- Use



Basis (factor = 1.00)

Cover Type:

- Comprehensive, standard deductible

Driver Characteristics:

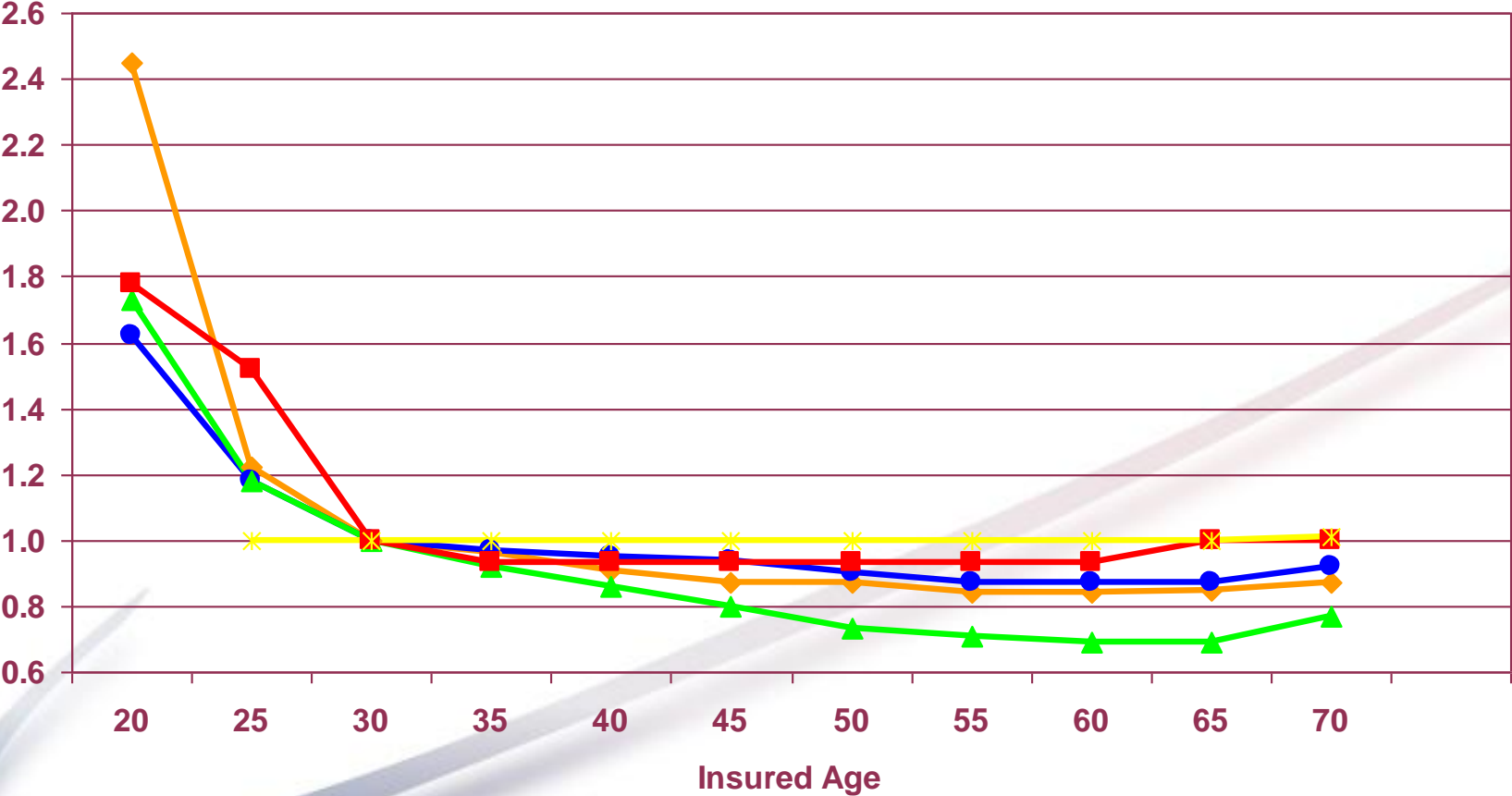
- Male
- 30 years old
- Single
- 2 years of driving experience

Vehicle Characteristics:

- Honda Accord
- Age 0
- Garaged at night
- Estimated Annual Mileage of 10,000 miles/km
- Used for Social, Domestic + Commuting usage



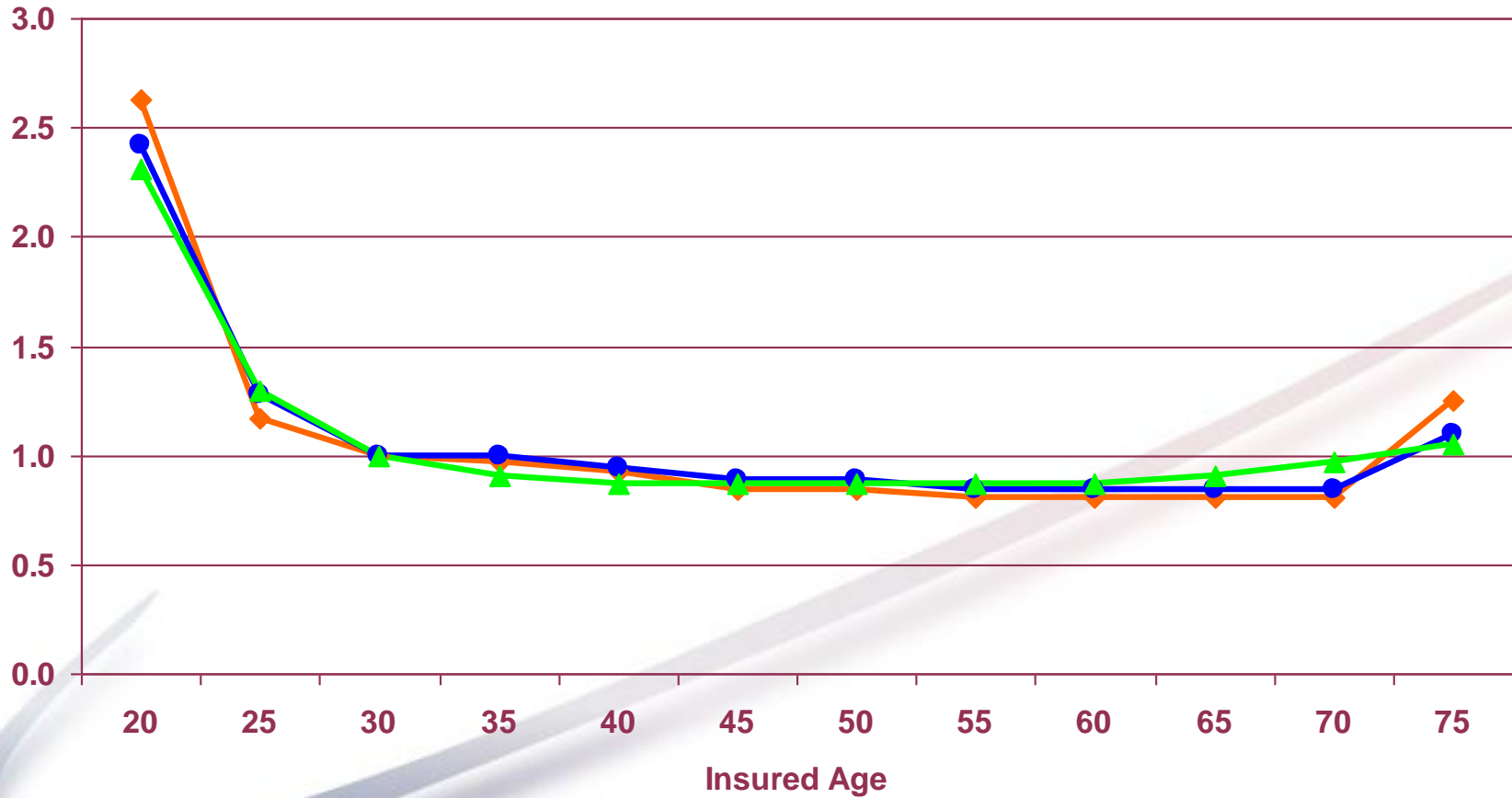
Comparison across Countries – Insured Age



USA Australia UK Singapore Germany



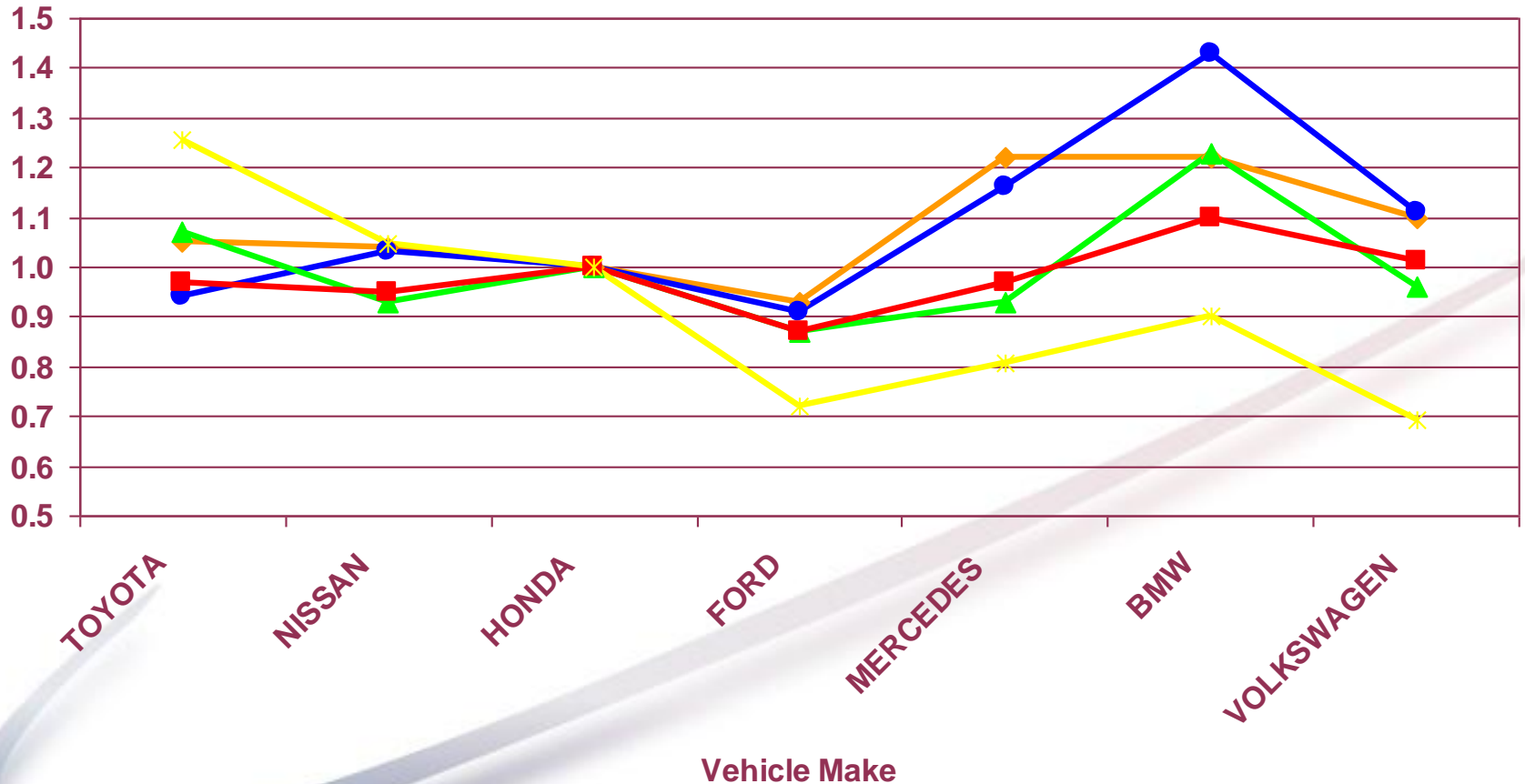
USA – Insured Age



Company 1 Company 2 Company 3



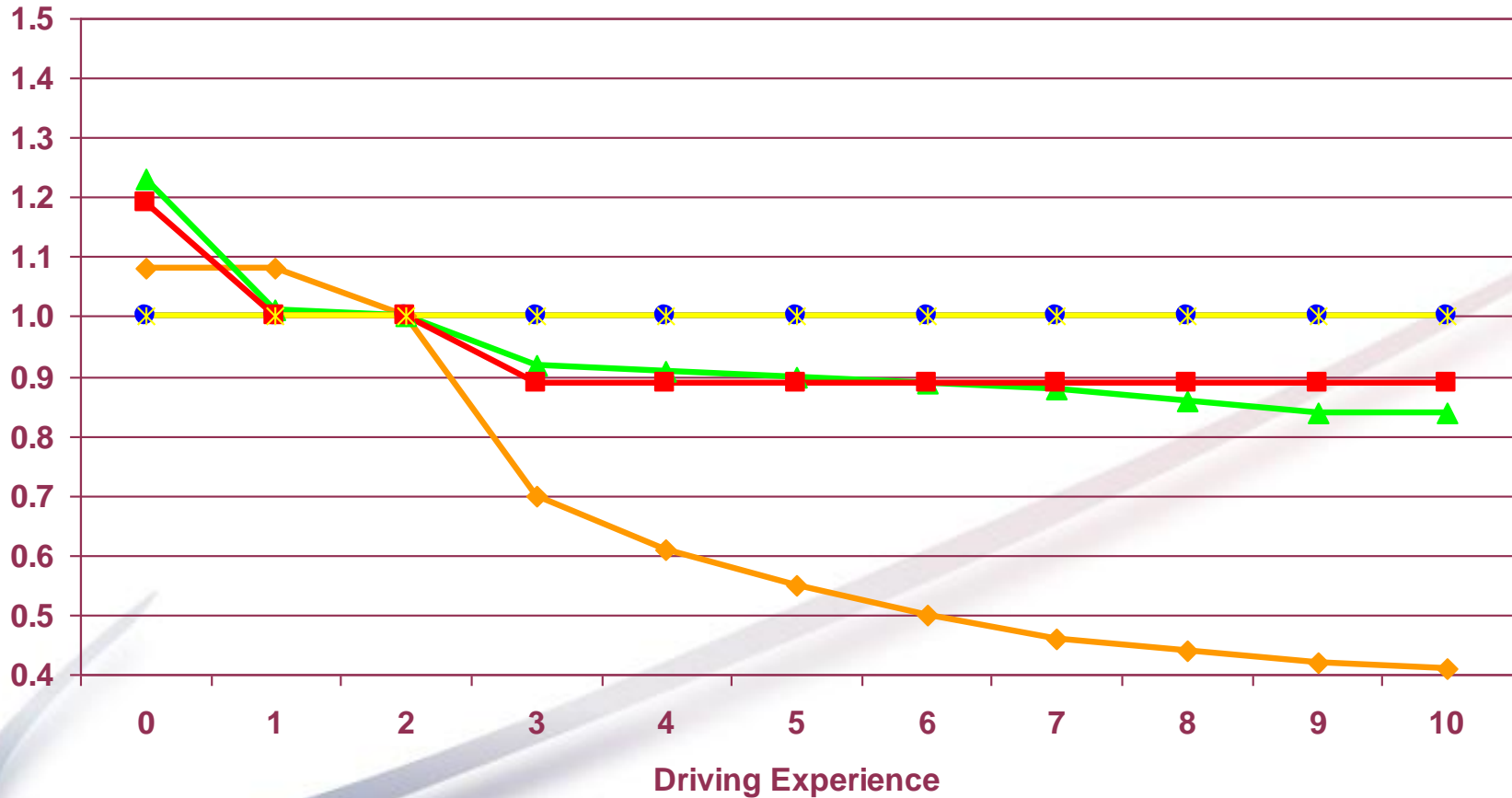
Comparison across Countries – Vehicle Make



USA Australia UK Singapore Germany



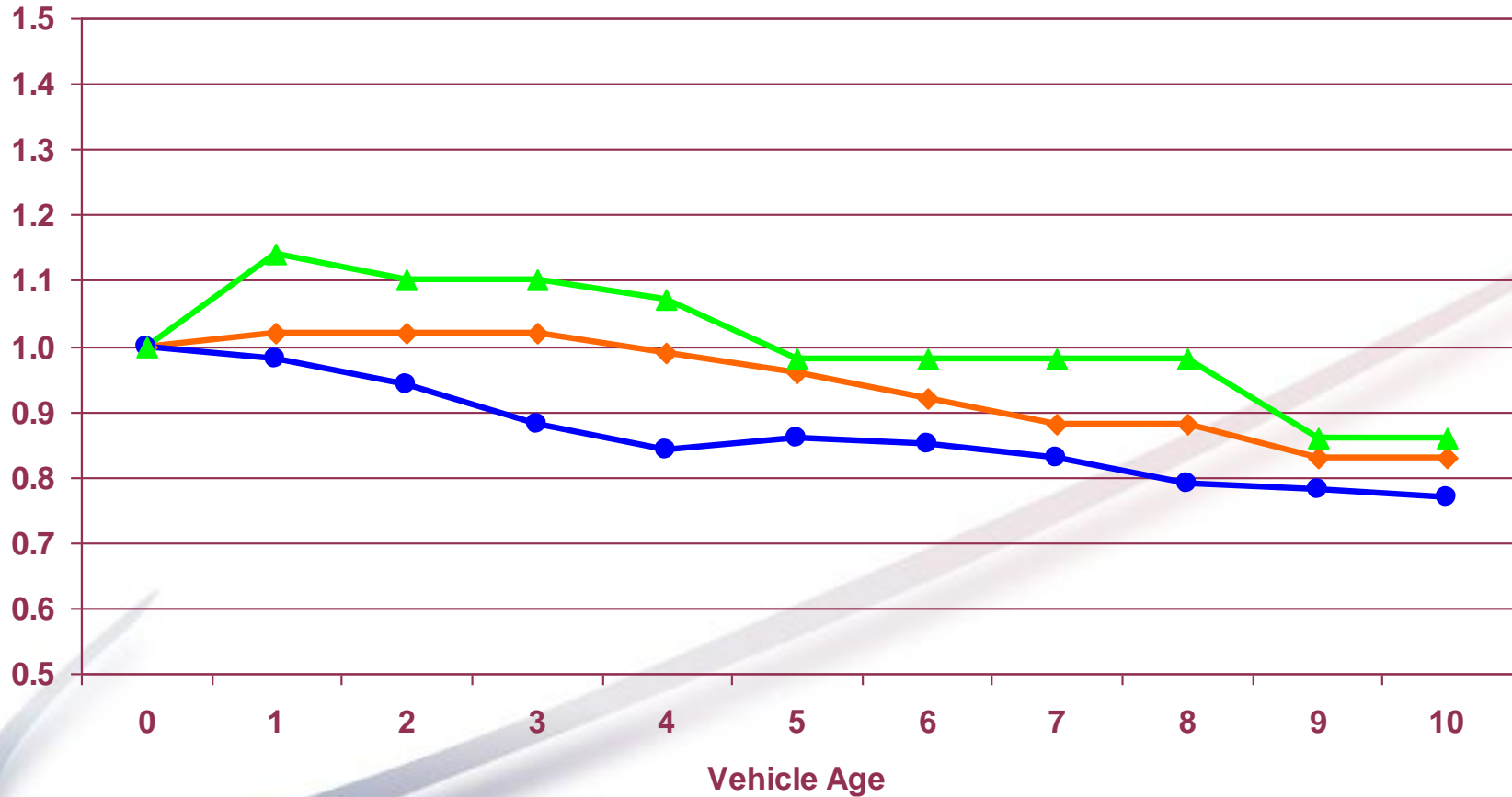
Comparison across Countries – Driving Experience



USA Australia UK Singapore Germany



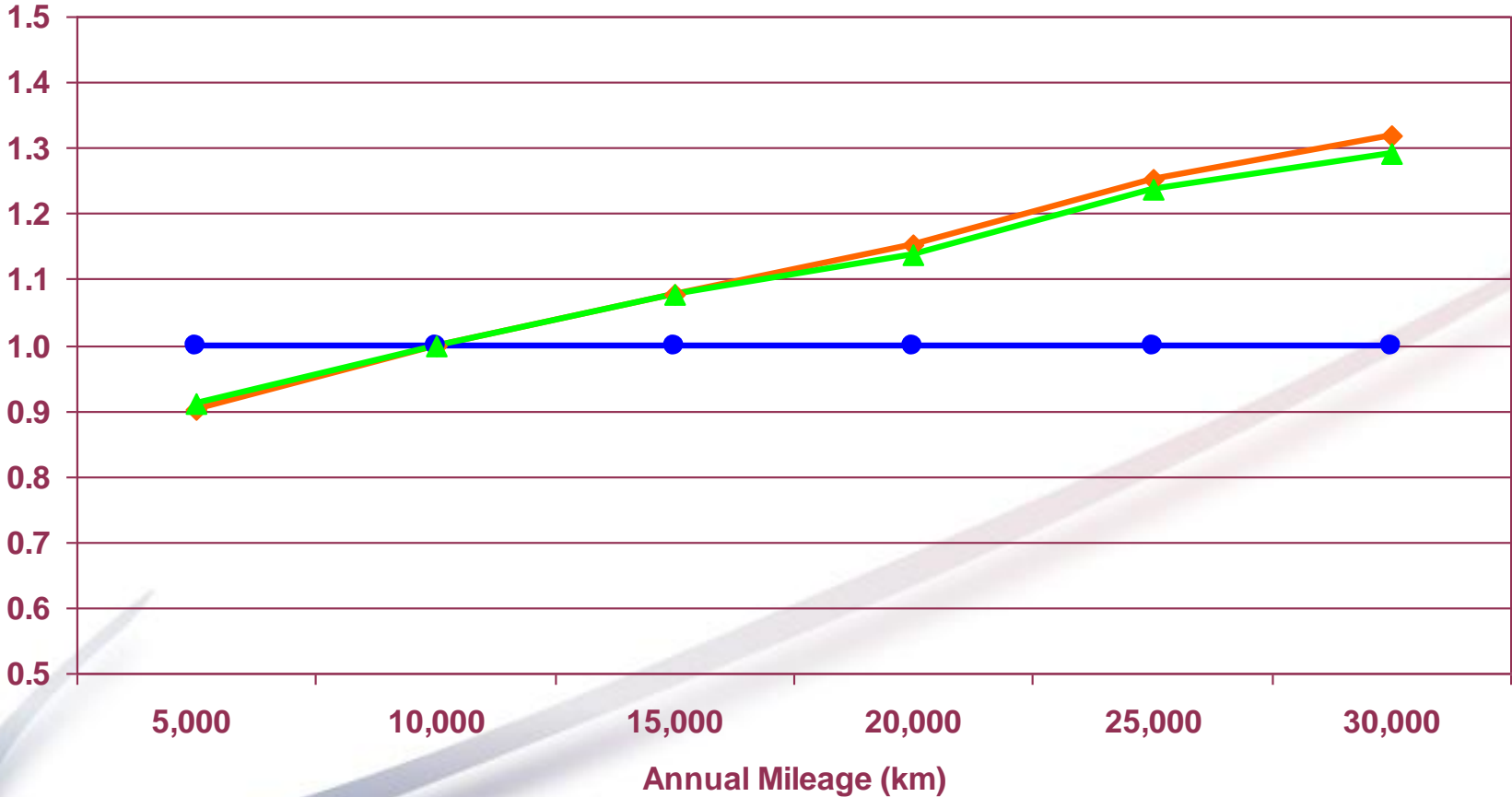
USA – Vehicle Age



Company 1 Company 2 Company 3



Germany – Annual Mileage



Company 1 Company 2 Company 3

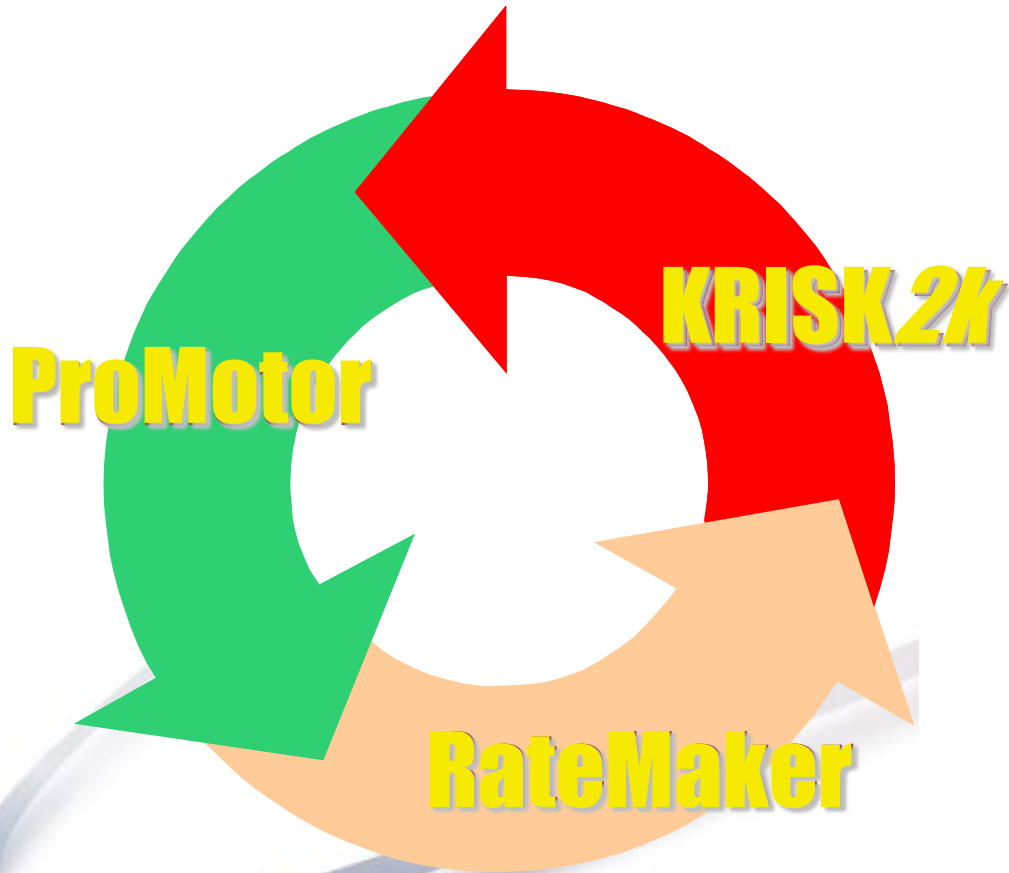


Conclusions

- **Not all risk characteristics are used in the same way in all countries**
- **Within countries, there are material differences between companies' use of certain risk characteristics**
- **In general, the following are the most important (in order):**
 - 1.Vehicle Make (/model)**
 - 2.Insured Age (largest extreme)**
 - 3.Driving Experience**
 - 4.Annual Mileage**
 - 5.Vehicle Age**



Gen Re's Motor tools are being used by the 2 largest Non-life insurers in China



Let us know if you want to hear us talk about...

- **Software tools for the pricing and analysis of motor and non-motor business**
- **How to price motor business**
- **Comparison of premium rate differentials**
- **Client segmentation & profit testing**
- **Reinsurance structuring support**
- **Underwriting related topics (Risk definitions, accumulation control, liability insurance, etc.)**
- **Nice places to visit in Europe**
- **<add your preferred topic here>**



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What is the “right premium”?

Is it “10% below the competition”?

Profitability with 65% less volume!



	Scenario A	Scenario B	Scenario C	Scenario D
Volume	100	100	200	65
Premium rate	1	0.9	0.9	1.1
Premium	100	90	180	72
Fixed Expenses	15	15	15	15
Var. Expenses	15	15	30	10
Loss	65	65	130	42
U/w Profit	5	-5	5	5



What is the “right premium”?

~~Is it “10% below the competition”?~~

	Scenario A	Scenario B	Scenario C	Scenario D
Volume	100	100	243	64
Premium rate	1	0.9	0.9	1.1
Premium	100	90	219	70

Fixed Expenses	15	15	15	15
Var. Expenses	15	15	36	10
Loss	68	68	165	44

← loss ↑

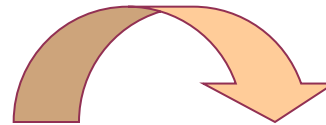
U/w Profit	2	-8	2	2
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What is the “right premium” (2)

~~Is it “total costs / # policies”?~~

5% Differentiated change in premium



	Client A	Client B	Overall
Volume	50	50	100
Premium rate	1	1	1
Premium	50	50	100

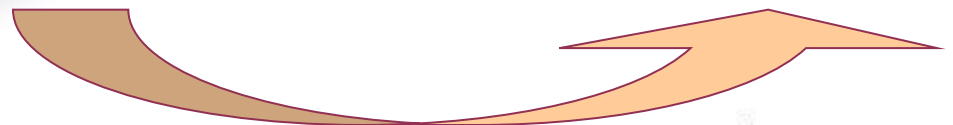
	Client A	Client B	Overall
Volume	70	30	100
Premium rate	0.95	1.05	1
Premium	66.5	31.5	100

Fixed Expenses	7.5	7.5	15
Var. Expenses	7.5	7.5	15
Loss	25	40	65

Fixed Expenses	7.5	7.5	15.0
Var. Expenses	10.5	4.5	15.0
Loss	35.0	24.0	59.0

U/w Profit	10	-5	5
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U/w Profit	13.5	-4.5	11.0
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Profit more than doubles!



Quick and dirty: How to calculate a premium (1)

1. Get data on policies and allocate the corresponding claims

- Cover information
- Premium information
- Risk characteristics
- Claim information
- Paid and reserved

2. Improve the quality of the data

- Checks
- IBNR and IBNER
- Major Loss Adjustment / Credibility / Interactions



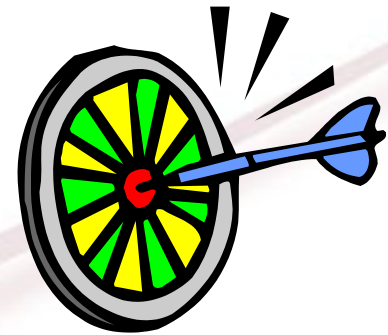
Quick and dirty: How to calculate a premium (2)

3. One-dimensional analyses (More-dimensional analyses if necessary)

- Risk characteristics
- Trends
- Claims reasons / types

4. Pricing

- Best model
- What are the factors
- Smoothing techniques: Marginal Sums, Simon Bailey, GLM



Example

GLM

Claimsburden		Type of car				Total	
		Small car	Large car				
Gender	Male	717	700	995	1,000	829	1.076 1.061
	Female	548	600	761	700	633	0.823 0.836
	Total	661	667	936	925	770	

$667/770 = 0.866$

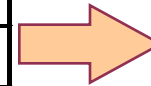
0.879
1.201
1.194

No. of vehicle-years		Type of car		
		Small car	Large car	Total
Gender	Male	20,000	15,000	35,000
	Female	10,000	5,000	15,000
	Total	30,000	20,000	50,000



The company data ultimately leads to an estimate of required Risk Premiums for all clients

pol. No	region	type class	sex	...	frequency	claims burden
75422	1	10	m		0	0
15656	1	12	m		0	0
24324	3	15	f		0	0
12321	5	20	m		0	0
54325	6	24	f		0	0
24456	7	25	f		1245	35698
68778	11	25	m		0	0



risk premium
356
444
567
588
601
723
866

empirical observations

adjusted data

prem

...

From Risk Premium to Gross Premium

- **Management expenses**
- **Commissions (both Agent and other)**
- **Standard discounts or loadings given**
- **Profit and security margins**



Example of a very simple premium calculation

VEHICLE DETAILS

Base points			
Cover	Comp	TPFT	TP
Base premium	1,500,000	700,000	500,000

Vehicle Age		
Age	Comp	TP/TPFT
0	-3%	-1%
1-3	5%	-1%
4-8	2%	-1%
9-20	-2%	5%
21 & above	-2%	-15%

Vehicle Capacity		
Capacity	Comp	TP/TPFT
1199 & below	-20%	-10%
1200-1399	-5%	-10%
1400-1499	-5%	5%
1500-1799	6%	5%
1800-1999	0%	5%
2000-2399	-10%	5%
2400-2699	20%	5%
2700-2999	20%	30%
3000-3999	20%	30%
4000 & above	Refer	

Vehicle Make Classification							
Class	Comp	TP/TPFT	Comprehensive				
			Class 1	Class 2	Class 3	Class 4	Class 5
Class 1	-23%	0	PRO	SUZ	TOY	HON	BMW
Class 2	-9%	0	DAI	HYU	NIS	MER	SAA
Class 3	1%	0	DAT	FIA	OPE	MIT	ROV
Class 4	8%	0	VOL	SUB	MAZ	FOR	JAG
Class 5	25%	0	DAE	VOV	PEU	SEA	LEX
			KIA	AUD		CIT	REN

Example: Comp, Vehicle Age 3, DAE, cap 1600, 50% NCD:
 premium = 1,500,000 * 1.05 * 0.77 * 1.06 * 0.50 = 643,000 Won

