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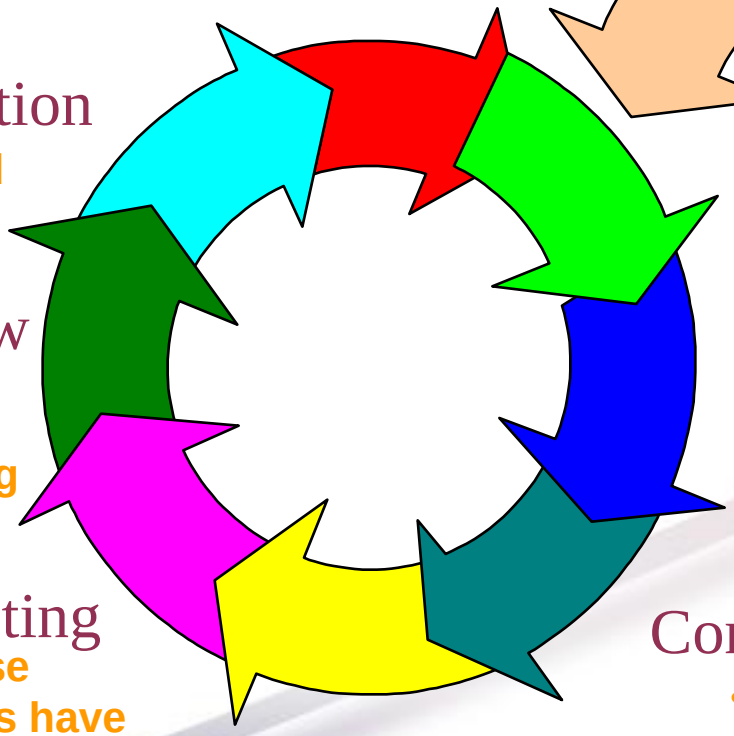
Premium Rating in Motor Business: an international perspective

Rob van Horssen, Gen Re

30 August / 2 September 2004

My own actuarial control cycle...



Monitoring
- are we getting the results we were expecting?

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?

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

Pricing and u/w guidelines
- decision making

Implementation
- taking quick and flexible action

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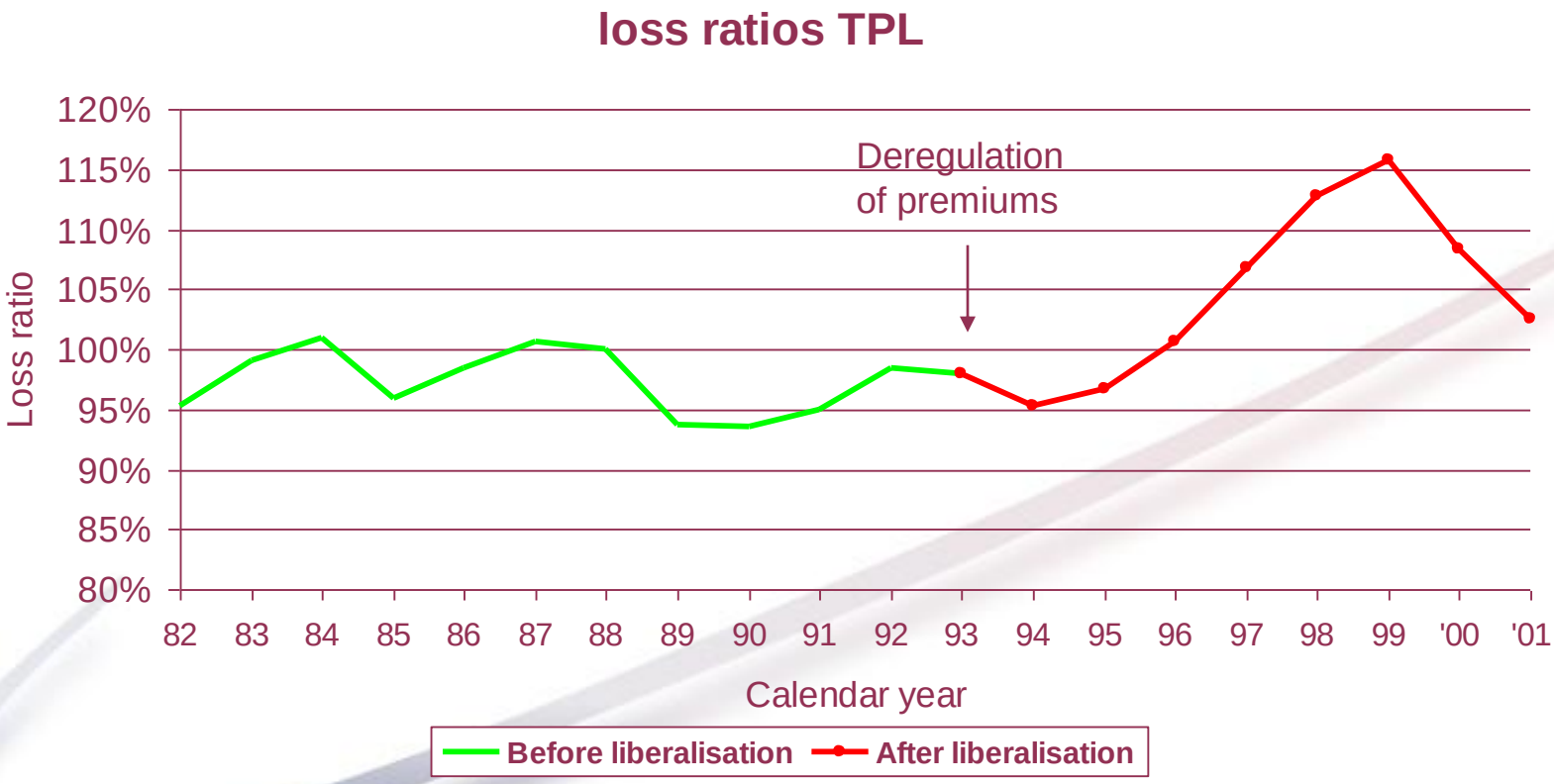
Motor insurance profits in Germany showed a disastrous trend after premium liberalisation



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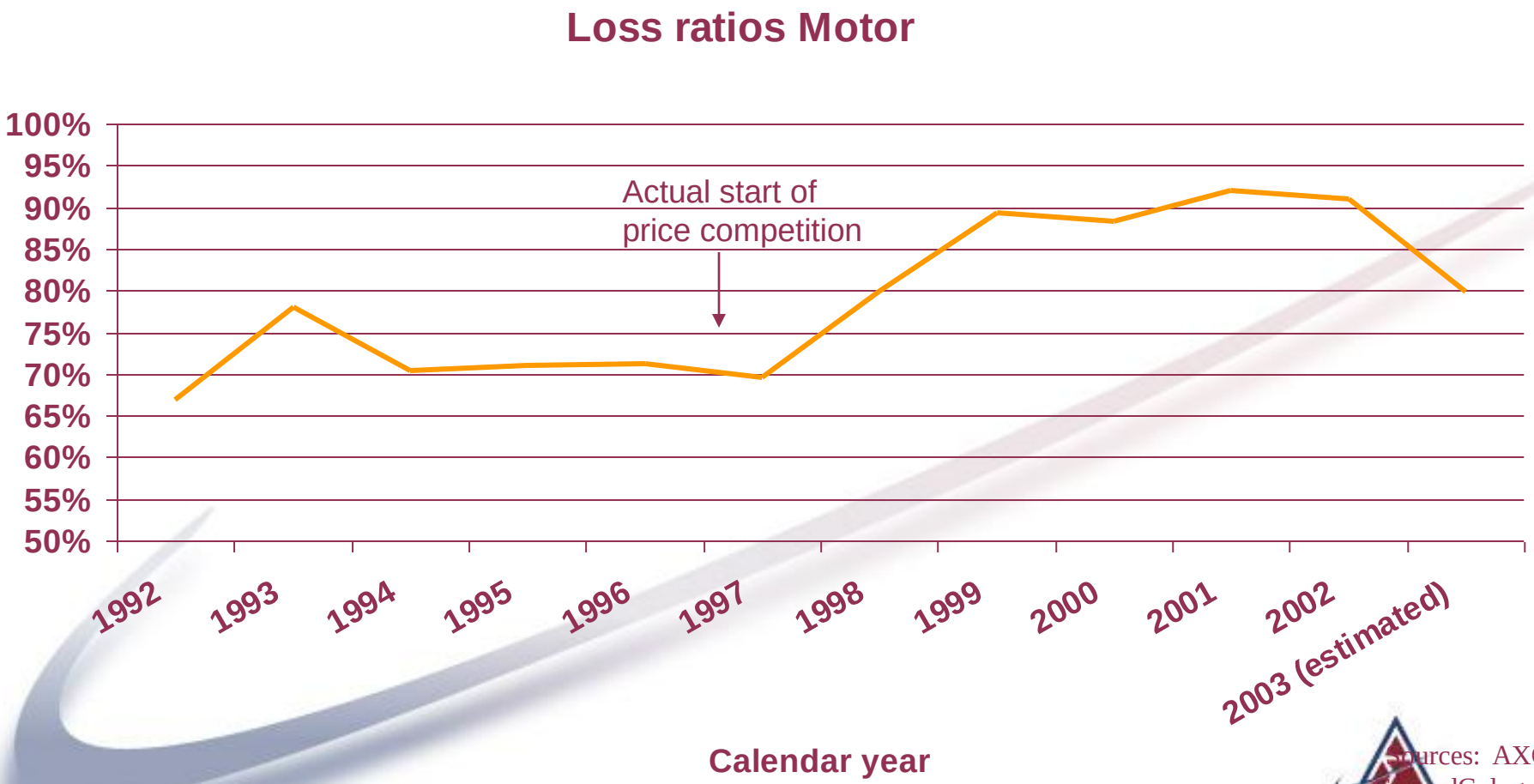
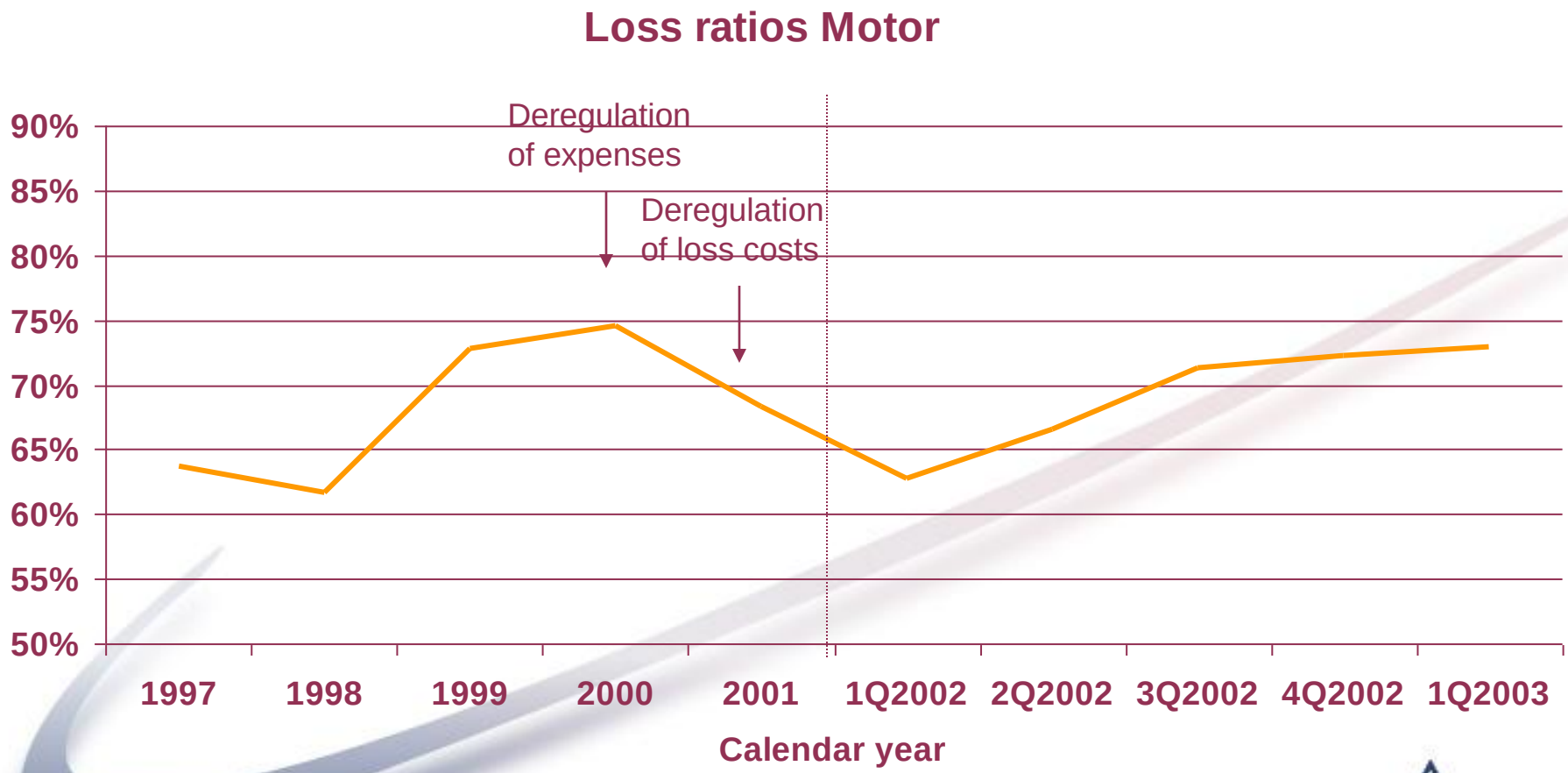
In Singapore, motor insurance profits are finally recovering



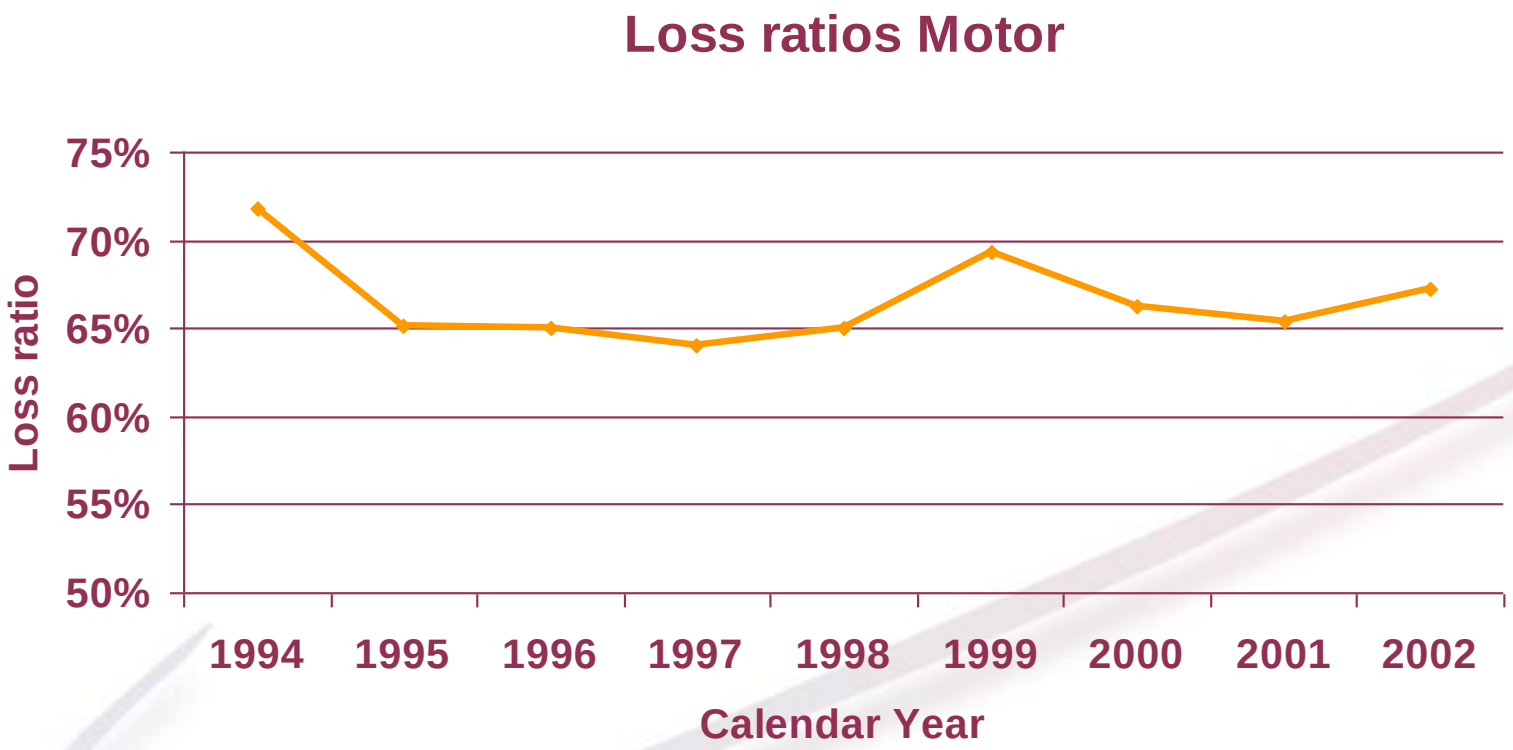
Sources: AXCO, GeneralCologne Re

In Korea, loss ratios are climbing fast



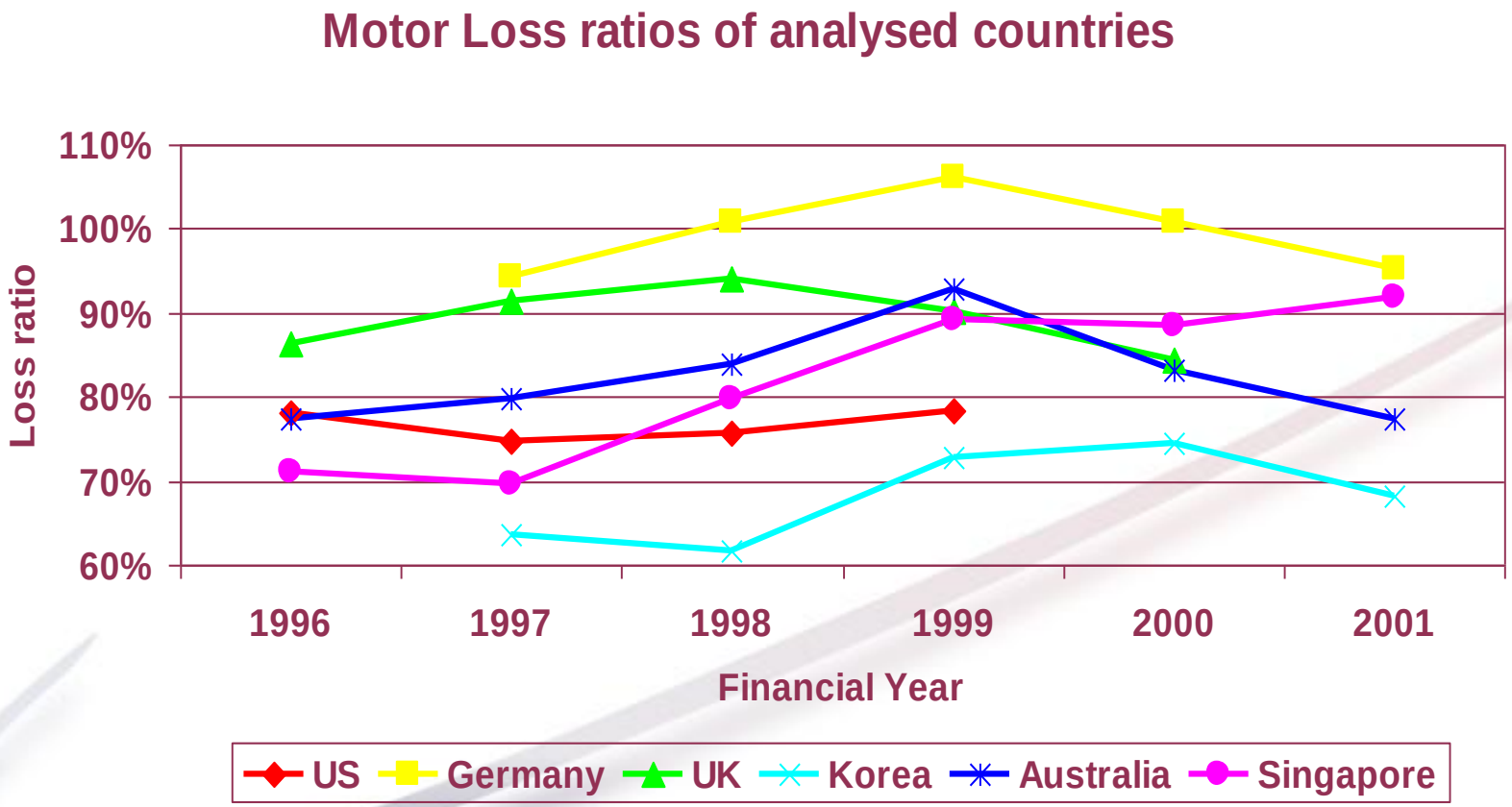
Source: KIDI

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



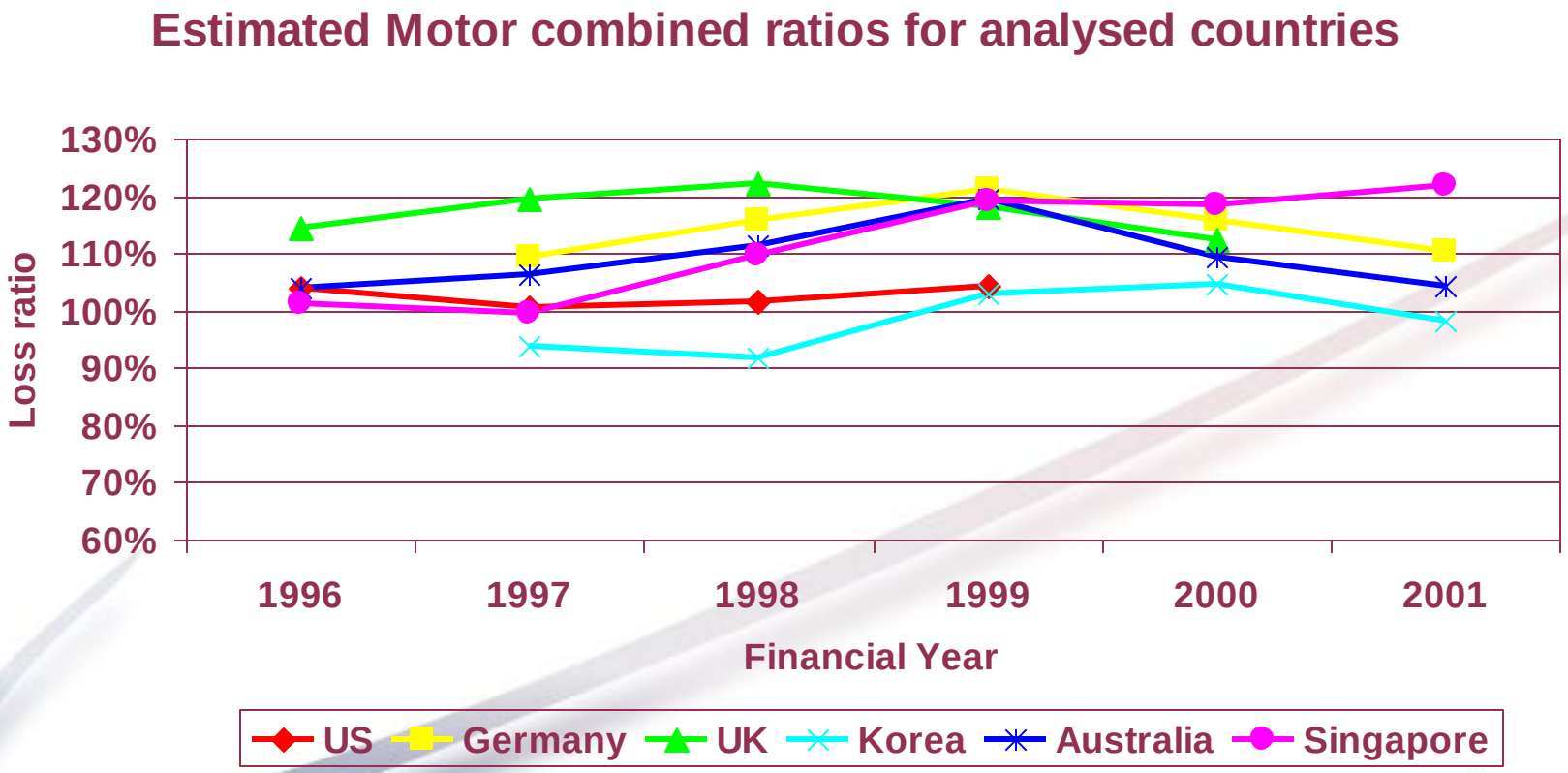
Sources: BNM, PIAM

Motor insurance in general is a very competitive market



Sources: AXCO, GDV, MAS, NAIC

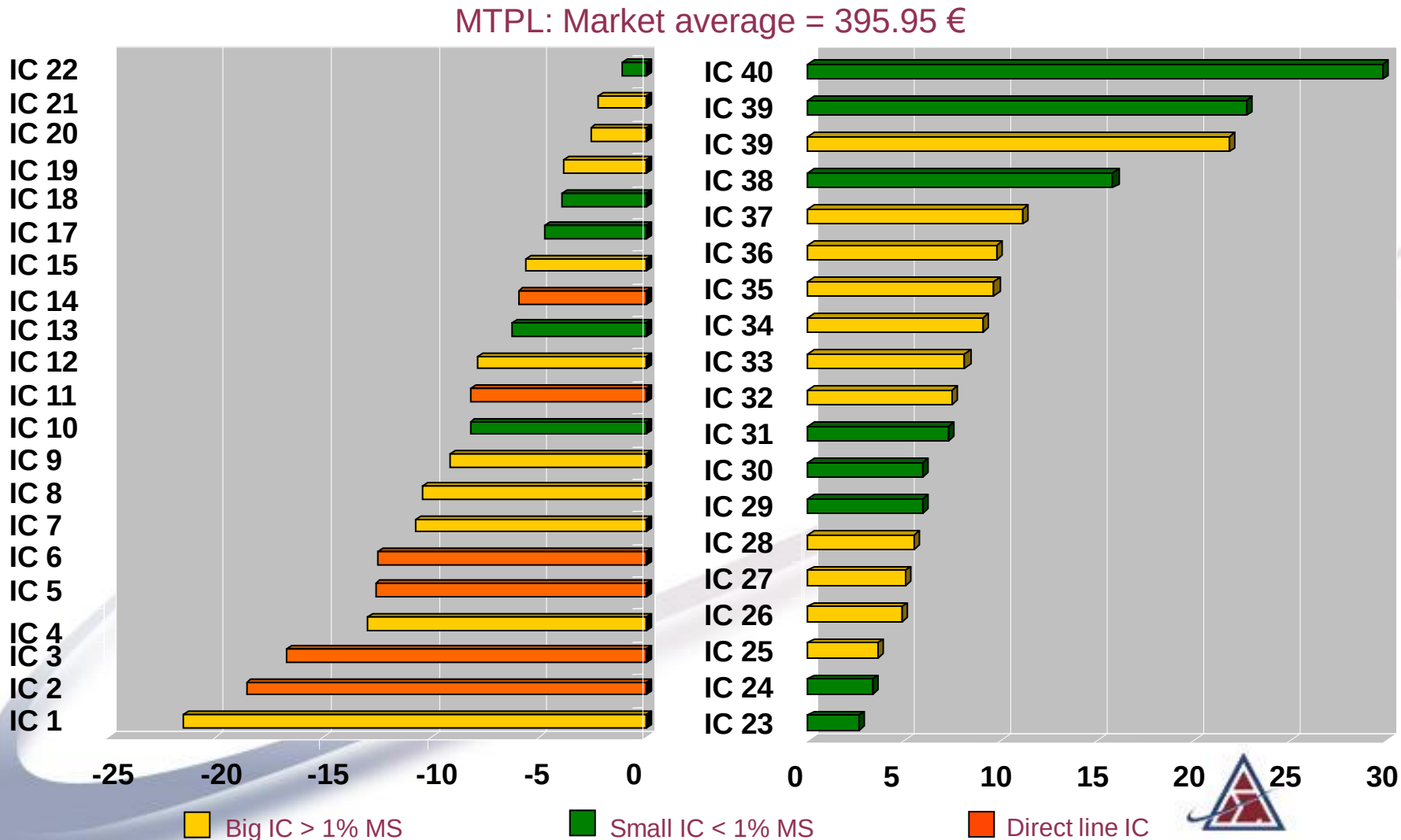
Motor insurance in general is a very competitive market



Note: Total expense ratio of 30% assumed for Korea

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

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



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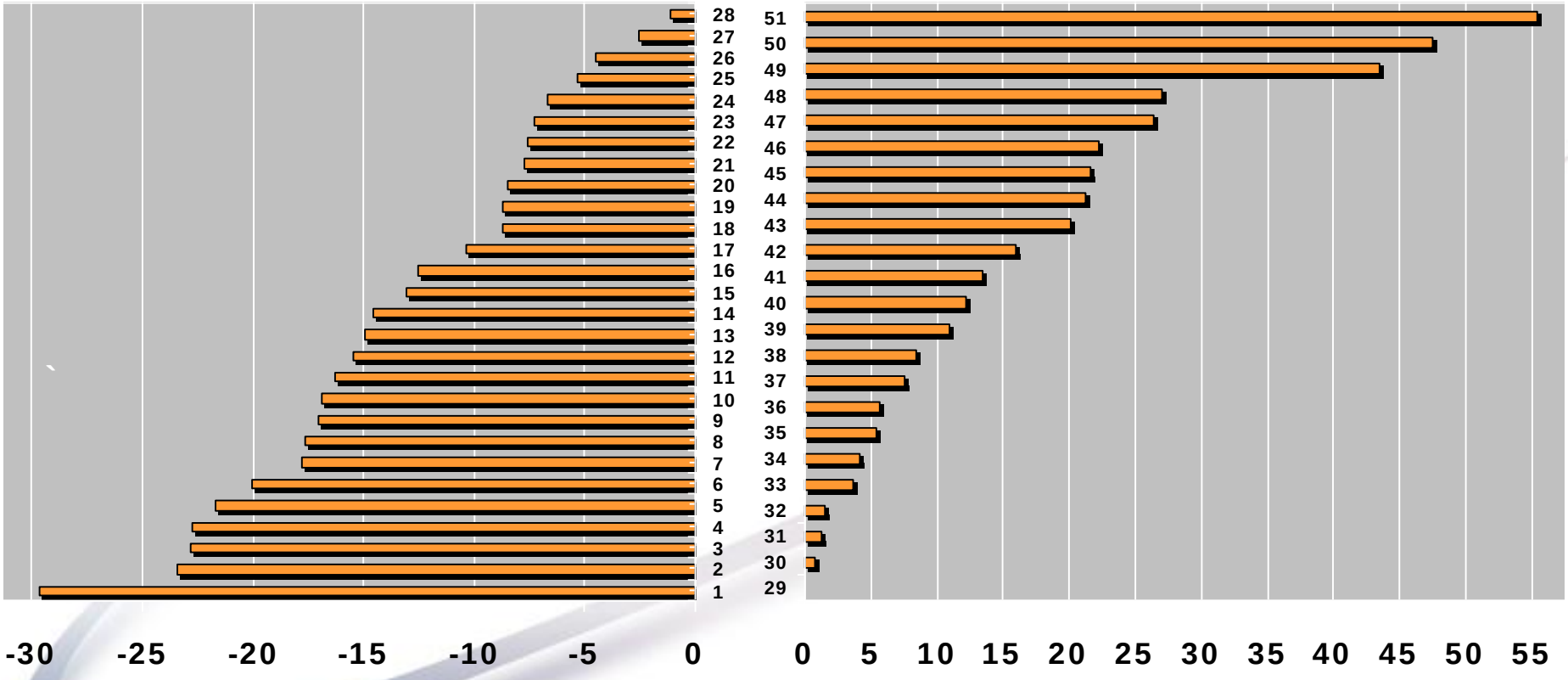
In the US, there are large premium differences between the 51 states

Market average = US$ 773



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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

What is the “right premium”?
Is it “10% below the competition”?

	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

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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
U/w Profit	2	-8	2	2

← loss↑

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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
Fixed Expenses	7.5	7.5	15
Var. Expenses	7.5	7.5	15
Loss	25	40	65
U/w Profit	10	-5	5

	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	15.0
Var. Expenses	10.5	4.5	15.0
Loss	35.0	24.0	59.0
U/w Profit	13.5	-4.5	11.0

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: Small car	Large car	Total		
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

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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 [redacted] . .

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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
Class 1	-23%	0
Class 2	-9%	0
Class 3	1%	0
Class 4	8%	0
Class 5	25%	0

Comprehensive				
Class 1	Class 2	Class 3	Class 4	Class 5
PRO	SUZ	TOY	HON	BMW
DAI	HYU	NIS	MER	SAA
DAT	FIA	OPE	MIT	ROV
VOL	SUB	MAZ	FOR	JAG
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

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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?**

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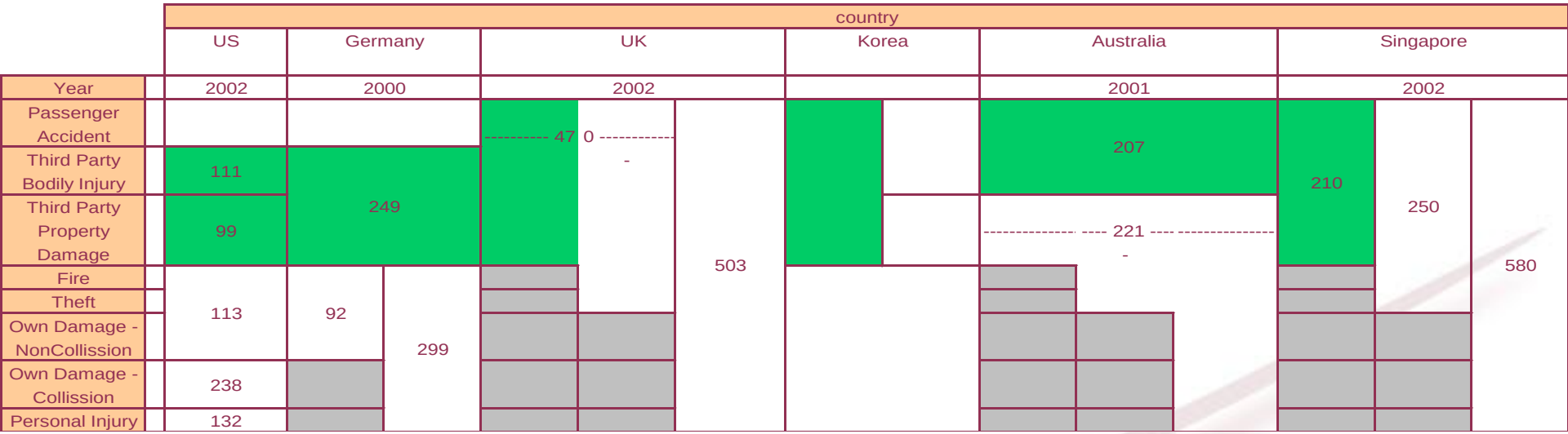
Coverages around the world are essentially the same, though they are built up in a different way

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

Note: Green areas are compulsory

Sources: ACA, multiple websites

Overall premium differences are not that great



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

Sources: AXCO, ISO, several reports

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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					
	residencial 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

Sources: 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					

Sources: multiple websites

Risk characteristics used – Other characteristics

		country					
		US	Germany	UK	Korea	Australia	Singapore
Other	use	x	x	x	x	x	some
	number or 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	

Sources: multiple websites

NCD systems differ greatly between countries

	country											
	US	Germany			UK		Korea		Australia		Singapore	
Cover		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%						
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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

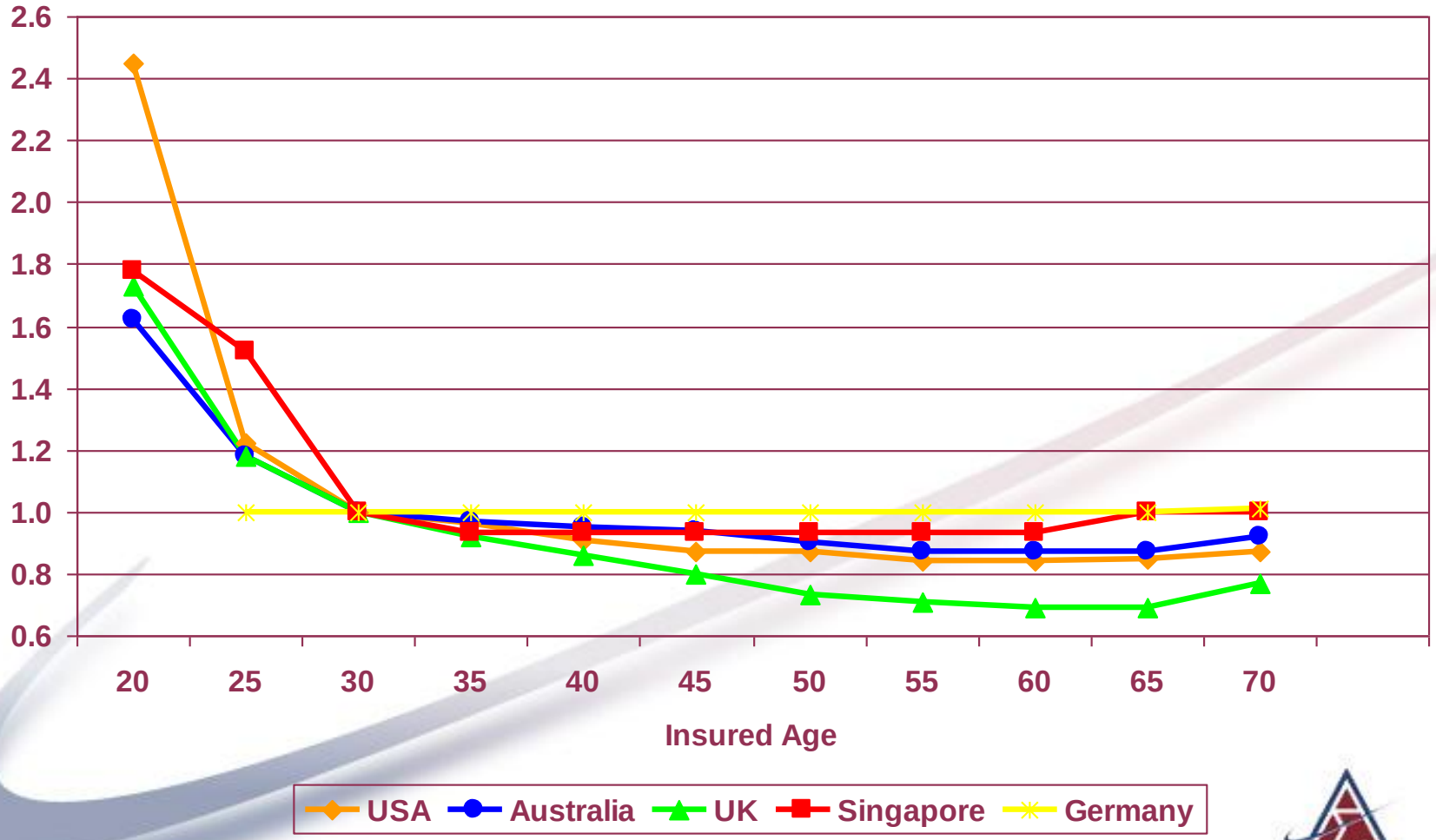
Basis (factor = 1.00)

Cover Type:
- Comprehensive, standard deductible

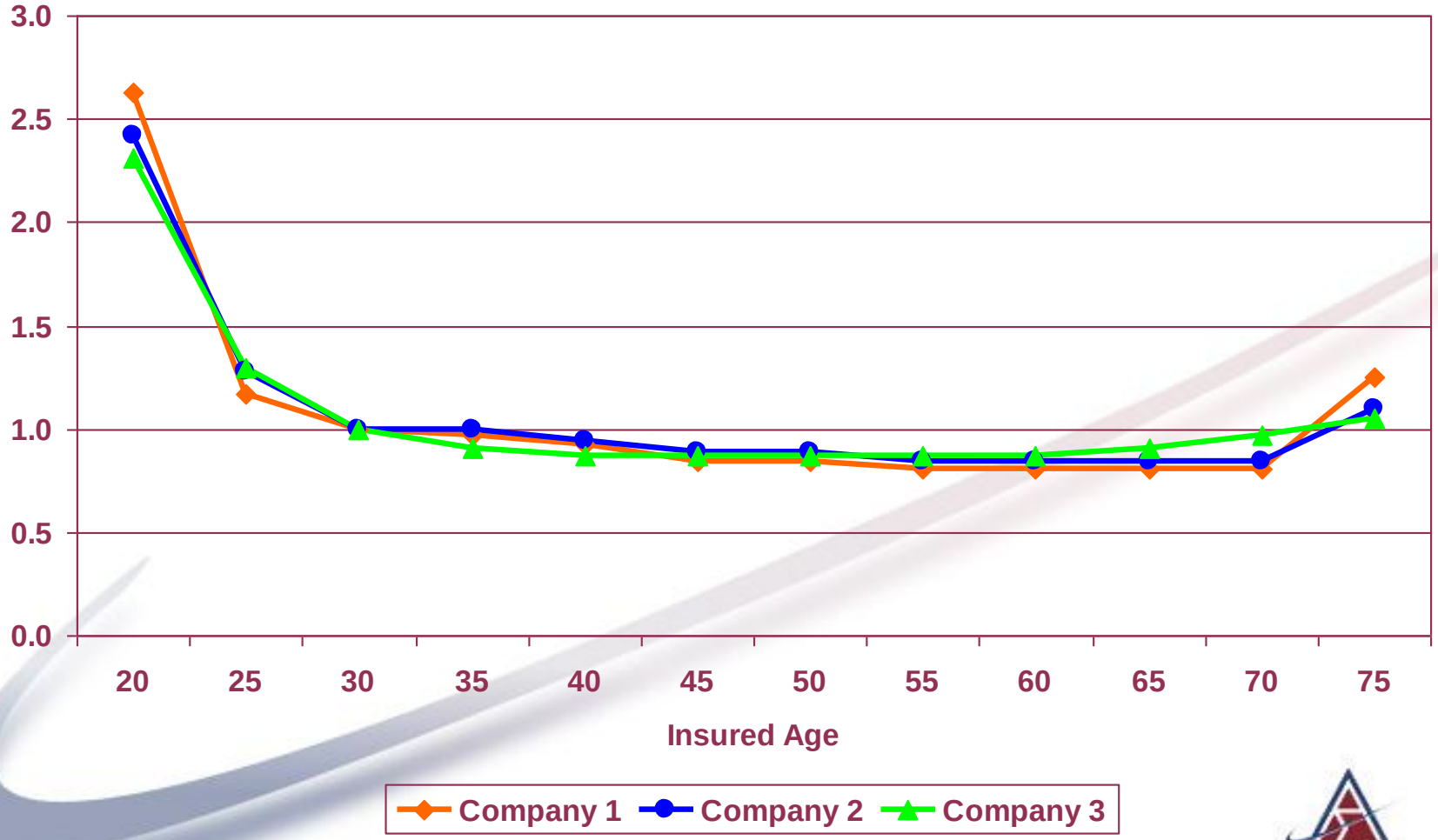
Driver Characteristics:
- Male
- 30 years old
- Single
- 2 years of driving experience

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

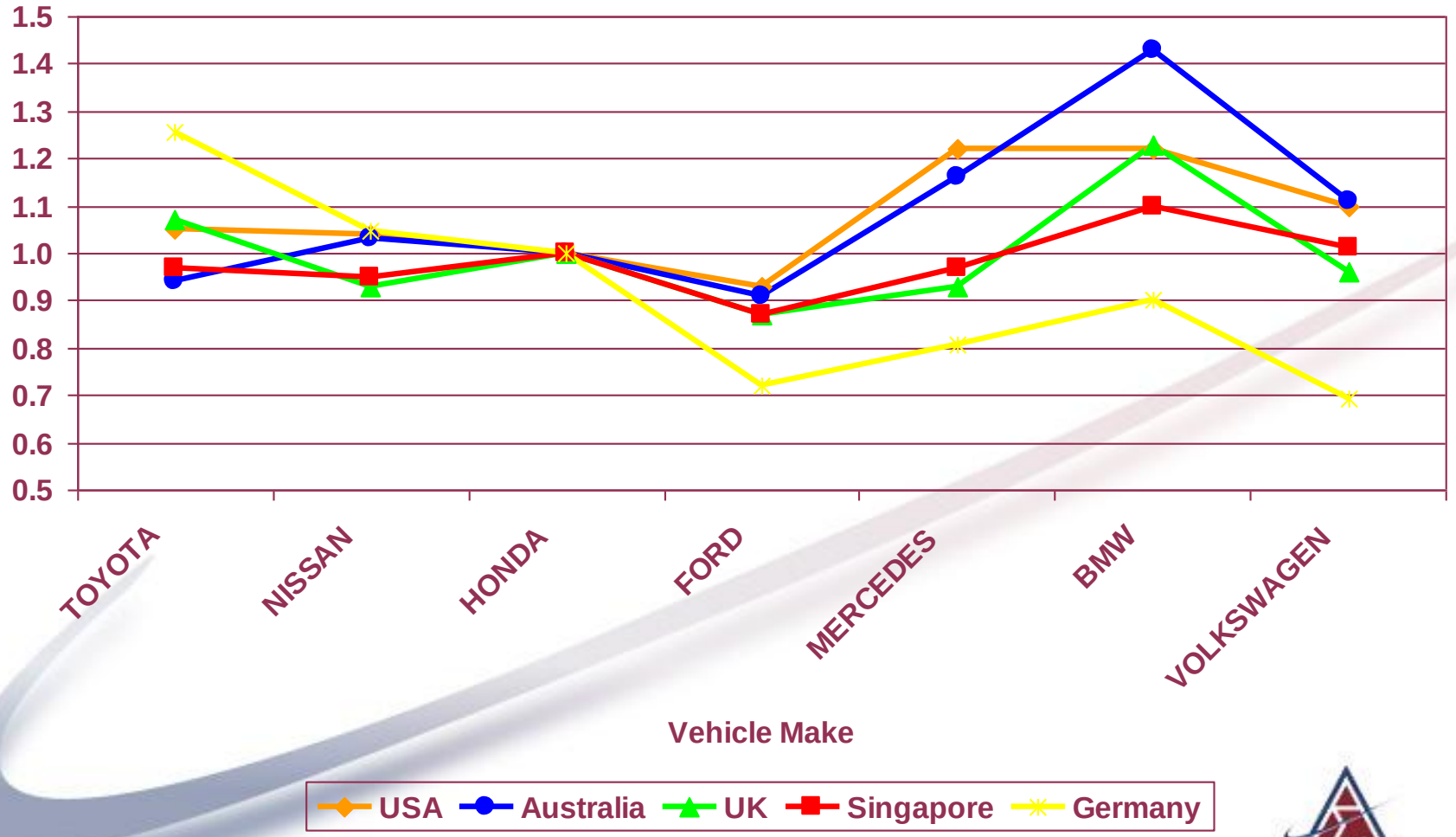
Comparison across Countries – Insured Age



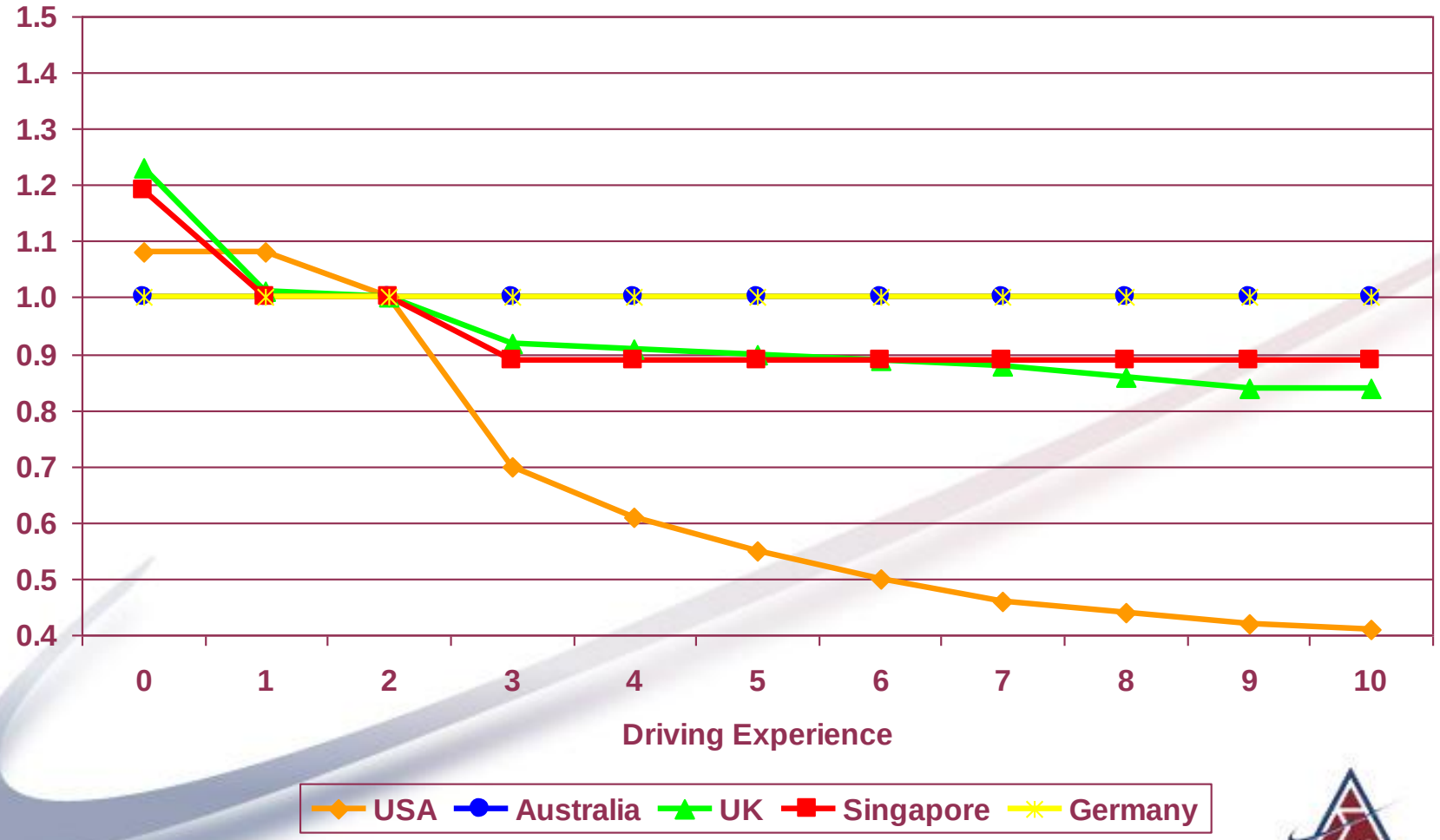
USA – Insured Age



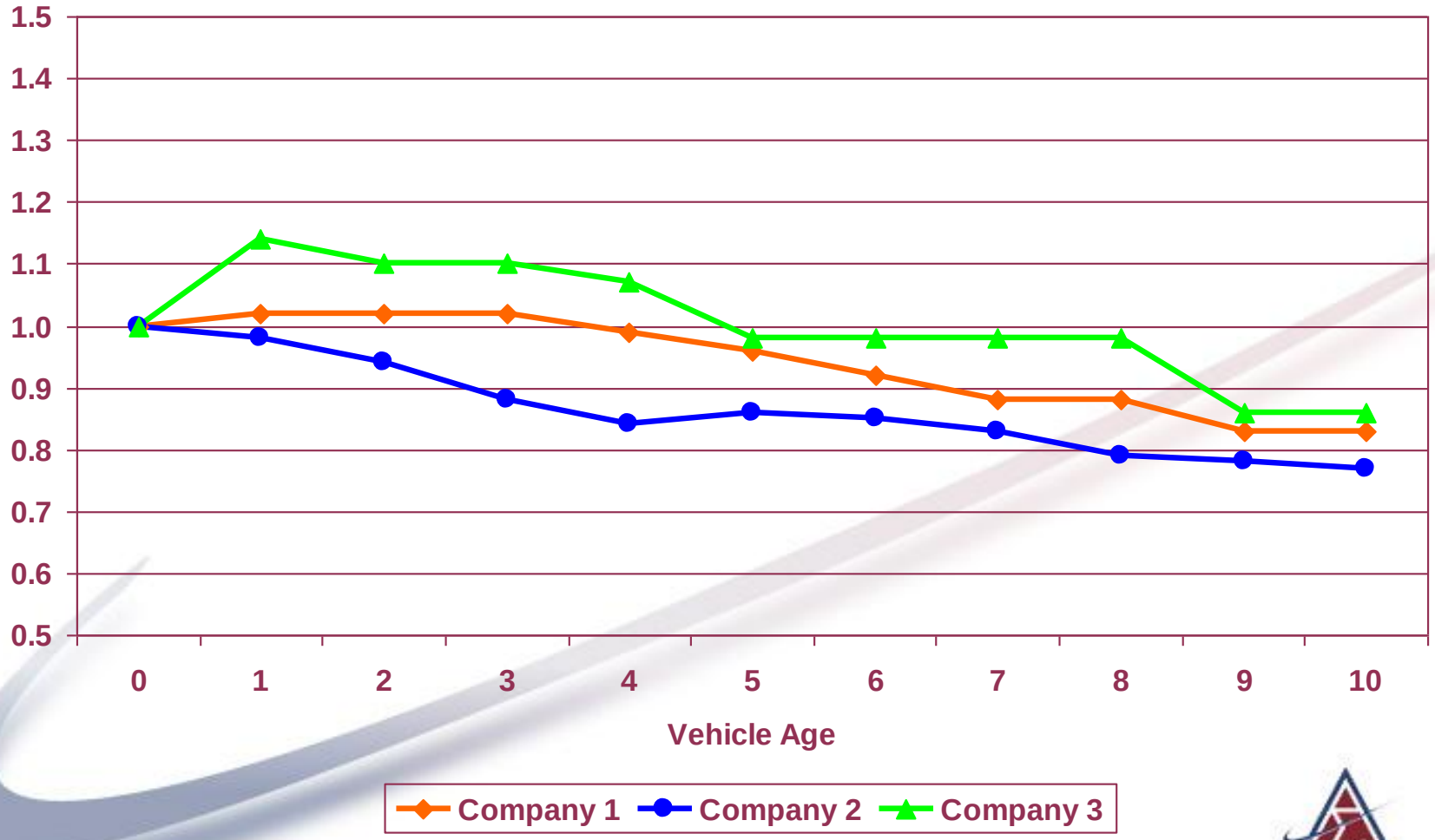
Comparison across Countries – Vehicle Make



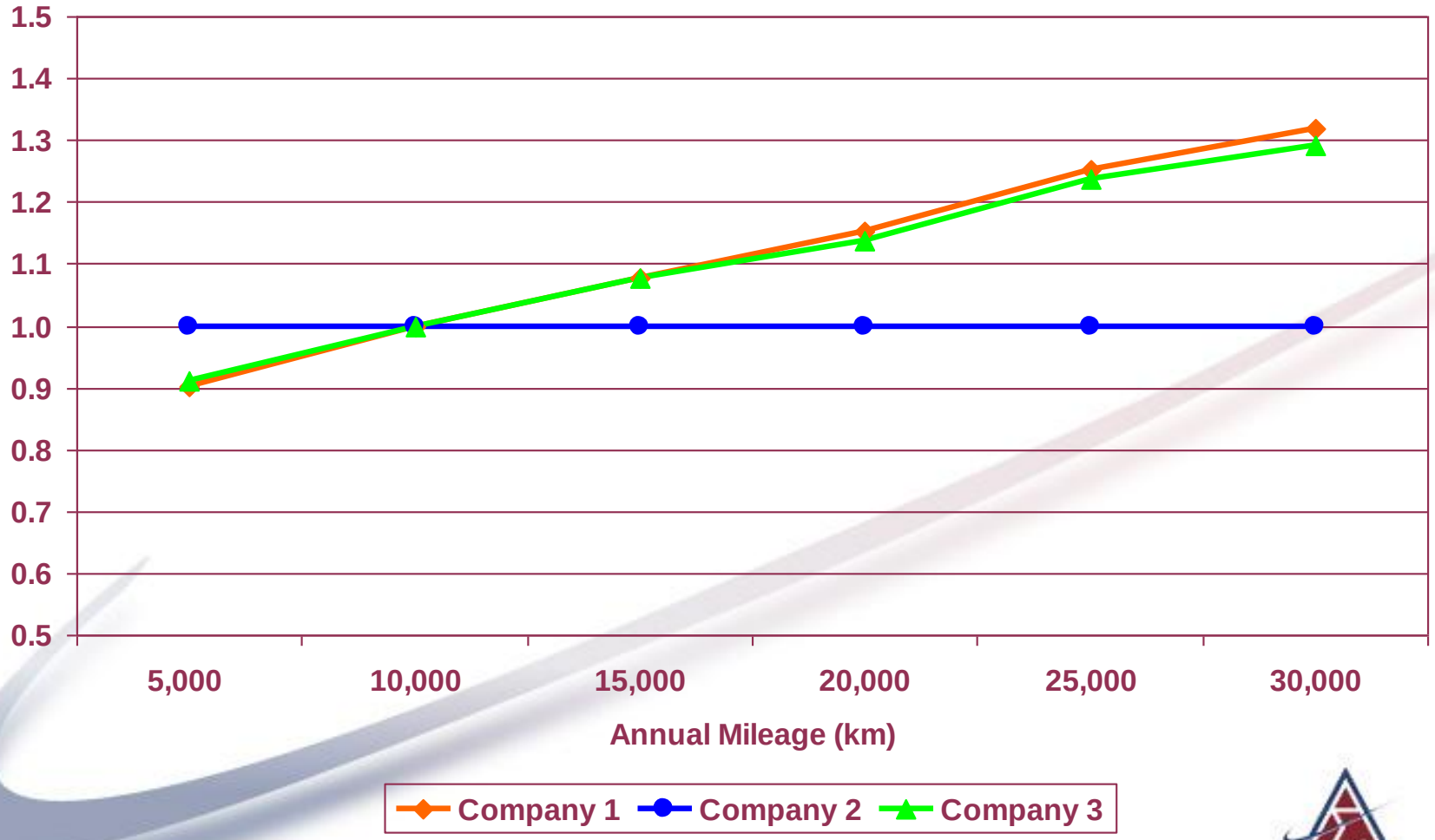
Comparison across Countries – Driving Experience



USA – Vehicle Age



Germany – Annual Mileage



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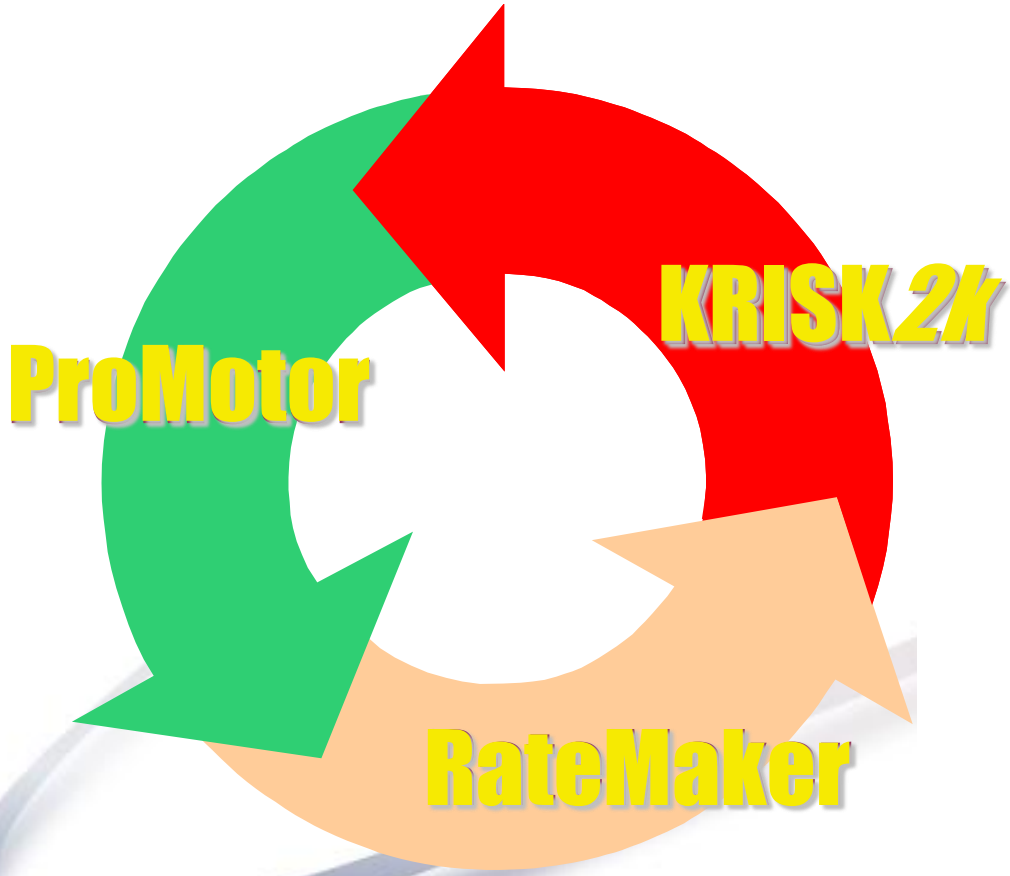
Conclusions

- 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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Contact details

Rob van Horssen

Treaty Account Executive / Senior Consultant

Gen Re
Room 1803, China Merchants Tower
161 East Lujiazui Road
Shanghai 200120
China P.R.

Tel. (8621) 58761100
Mobile: (86) 13817834171
Fax. (8621) 58784018
E-mail: rvanhor@genre.com

罗豪笙

资深精算顾问/
合约业务发展经历

科隆再保险公司 上海分公司（筹）
上海浦东陆家最东路161号
招商局大厦18楼1803室
邮编：200120

电话：（8621）58761100
收集：（86）13817834171
专真：（8621）58784018
电子邮箱：rvanhor@genre.com

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