

Large Liability Claim in Malaysia

Observations in Combined Liability XL Market

SAS GI Conference 2013

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Devin Tey Speaker Bio

Devin Tey currently working as Vice President for Guy Carpenter Analytics , was served as Head of Actuarial Services with Asia Capital Re ; Regional Actuarial Manager with Converium Asia Pacific Branch.

He hold a M.Sc in Statistical Science from Tsing Hwa University and a B.Sc in Mathematics from National Taiwan University. Devin was a medal winner in Mathematical Olympics competition, and now a part-time student in Shanghai Jiao Tung MBA program.

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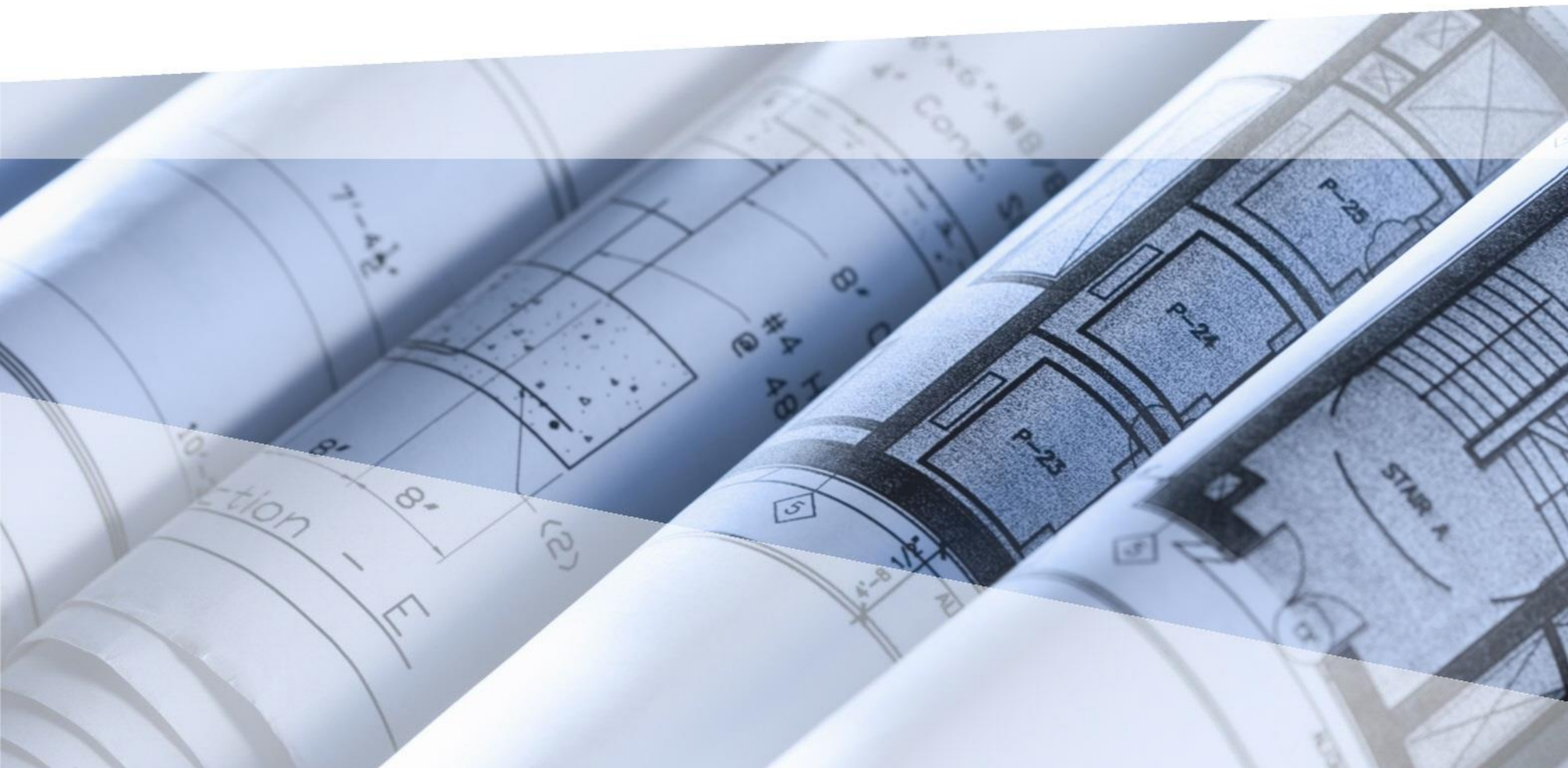
Agenda

Malaysia Combined Liability XL

1. Introduction
2. Claim Statistics
3. Actuarial Models
4. Market Benchmark
5. Look into future
6. Concluding Remarks

Section 1

Introduction



Malaysia Motor Tariff and MMIP

- Premium Rate is under tariff rate
 - Has not been revised since 1978
 - Gradual revision of tariff , effective from 16 Jan 2012
 - BNM target full de-tariffing in 2016
- MMIP , Malaysia Motor Insurance Pool
 - Established since Apr 2006
 - All insurers allowed to pass high risk policy on 100% to MMIP in return for a commission of 6.5%
- MIB, Motor Insurance Bureau
 - Set up by industry to indemnify victims of uninsured vehicles

Malaysia Motor Legal System

- The Malaysian legal system adopts the common law adversarial system and common law rules of precedent
- The Road Traffic Act 1987 obliges vehicle owners using public highways to insure for third party liability for bodily injury for an unlimited amount
- Public transport vehicles - which include buses and taxis - must have unlimited passenger liability insurance
- There are three tiers of civil courts: the subordinate courts, the high court and the appellate courts.
 - Subordinate courts with civil monetary jurisdictional limits of MYR 250,000
 - Claims exceeding MYR 250,000 are heard by the high court

Legal System

Court Backlog and Delay Reduction Program

--World Bank , August 2011

Table 6: Ageing Lists by Year – All Trial Courts, Civil Cases, 2009-April 2011

Year of Filing	HIGH COURT			SESSIONS COURT			MAGISTRATE'S COURT		
	2009	2010	April 2011	2009	2010	April 2011	2009	2010	April 2011
PRE 1990	10	6	6						
1991	8	3	3						
1992	2	7	1	2					
1993	4	1		1					
1994	9	8	7	1			1		
1995	14	3	1	1					
1996	25	9	7	4					
1997	29	6	7	4					
1998	50	13	10	12	1		1		
1999	66	26	20	10	1	1	1	1	
2000	256	35	20	68	6	1	3		
2001	343	87	52	128	14	8	3		
2002	604	144	73	332	23	6	12		
2003	972	261	152	577	29	5	47		
2004	1503	401	197	1060	39	19	109	3	
2005	2179	480	285	2120	126	28	249	8	
2006	3016	738	475	3339	237	58	511	21	3
2007	4710	1117	826	5870	577	172	1251	41	6
2008	8673	2354	1711	11995	2500	747	4169	201	128
2009	22400	4039	2789	36135	7394	2935	65324	898	245
TOTAL	44,873	9,738	6,642	61,659	10,947	3,980	71,681	1,173	382
2010		23901	9931		36894	15588		65618	5447
2011			11681			26978			48369
TOTAL			28,254			46,546			54,198

Source: Statistics Unit of Federal Court

Table 9: Comparison of Carryover, New Filings, and Dispositions – All Courts, 2009-April 2011

Court	Case Type	Balance Forward from 2008	Closed/ New Entries 2009	Closed/New Entries 2010	Closed/New Entries thru April 2011	Balance Forward to May 2011
Federal Court	Cv	53	55/58	79/35	24/36	57
	Cr	103	172/183	179/145	89/77	97
	L/A	154	374/375	419/462	241/179	242
Court Of Appeal	Cv	8,832	4,054/4,385	5,553/5,572	2,203/1,637	8722
	CrI	882	417/660	382/840	305/247	1487
	L/A	0	569/1,052	1,548/1,711	526/453	697
High Courts	Cv	93,523	96,168/72,148	100,425/77,053	28,858/23,000	28,254
	Cr	4,544	6,629/5,580	7,117/7,125	2,409/2,408	3,738
Sessions Courts	CvI	94,554	160,906/141,031	176,880/159,942	58,134/53,884	46,546
	Cr	8,750	31,247/31,856	27,418/ 26,037	13,945/12,941	6,997
Magistrates Courts	Cv	156,053	367,138/306,246	338,890/327,045	113,037/100,246	54,198
	Cr	65,221	159,392/144,048	205,334/173,417	44,506/39,782	22,882
Sub-Total Trial Courts		422,645	831,480/700,909	856,064/770,619	260,889/232,261	162,615
Total		432,669	827,121/707,622	864,224/779,384	264,177/234,890	173,917

Source: Statistics Unit

- Phase 1 :Early statistics show reduction the backlog between 2009-2011
 - Much of the advance, depending on ramping up resources temporary
 - Lack of central database and tracking system
- Permanent transformation depending on the phase 2 reform

Section 2

Claim Statistics



Largest Claim Reported

- “Ten-year-old girl awarded highest accident claim in the country”
 - The Star, Dec 2006
 - Sessions Court awarded RM9.8mil
 - Final Settlement RM 4.5mil
- American Couple, Karak Highway
 - Sessions Court awarded RM 8.75mil
 - High Court reduce the amount of damages to RM 1.33mil
- From GC Claim database, as at Mar-2013
 - Largest claim reported RM 4.84 mil

International MTPL

Accidents

- Wiehlthal Bridge Accident, Germany
 - Car collided with tanker truck, truck exploded, bridge destroyed
 - € 358 million
- Serby Rail Crash, UK
 - A Land Rover ran onto railway track
 - Two Train collided ,10 people killed,82 Injured
 - £50 million
- Mont Blanc Tunnel, Italy
 - Lorry caught fire middle of the tunnel, 52 hours burning
 - 41 people killed, 34 injured
- Kowloon Bus, Hong Kong
 - bus fell off a bridge, 21 people killed, 20 injured
 - HKD 82 million

Malaysia Combined Liability XL GC Claim Database

- Guy Carpenter been one of the leading reinsurance broker in Malaysia CXL market
- Combined Liability XL normally cover
 - Motor, Motor Third Party Liability (>90%)
 - General Liability (<5%)
 - Employer Liability (<5%)
- Unlimited layer on the Motor Third Party Liability
- GC collect large CXL claims dated back to 1990's
- The claim database is believed to covered at least 65% of Market ,
measure in term of direct premium income
- Include large claim register from 12 insurers
- Total claim count: 10,999
 - Reporting threshold vary, however

Claim Statistics

IBNER & IBNR

Treaty Year	Status	Claim No.	Insured	Date of Loss		Claim							
						@31.12.04	@31.12.05	@31.12.06	@31.12.07	@31.12.08	@31.12.09	@31.12.10	@31.12.11
2004	Closed	C123456	Mr ABC	01.08.2004	Paid	20,000	20,000	20,000	205,369	205,369	205,369	205,369	205,369
					OutStanding	100,000	100,000	100,000	-	-	-	-	-
					Total Incurred	120,000	120,000	120,000	205,369	205,369	205,369	205,369	205,369

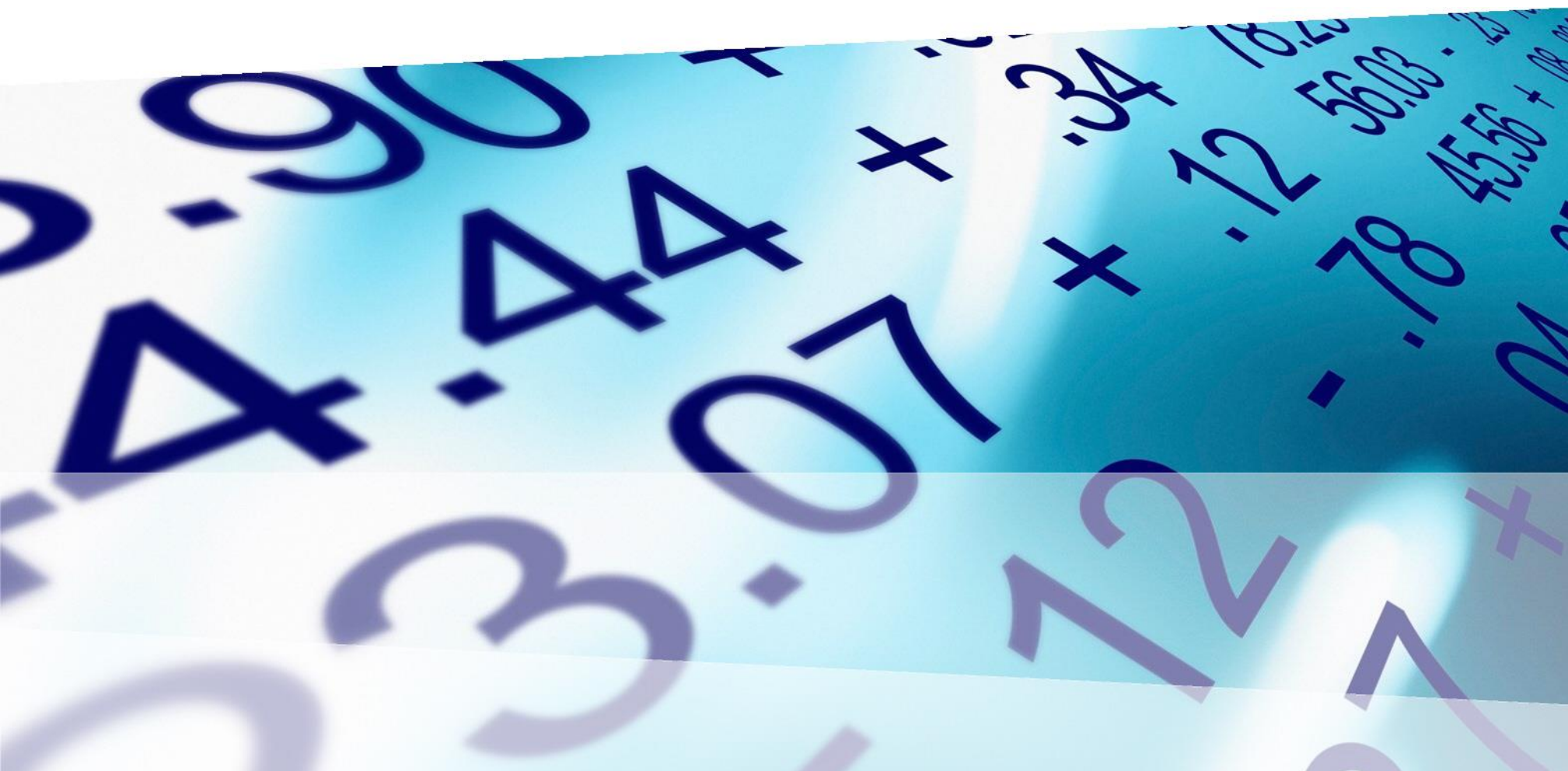
- Typical Claim Record
 - Per Each Individual Claim
 - Split of Paid and O/S
 - Status of claim

Treaty Year	Status	Claim No.	Insured	Date of Loss		Claim							
						@31.12.04	@31.12.05	@31.12.06	@31.12.07	@31.12.08	@31.12.09	@31.12.10	@31.12.11
2004	Closed	C123456	Mr ABC	01.08.2004	Paid					20,000	20,000	20,000	205,369
					OutStanding					100,000	100,000	100,000	-
					Total Incurred	-	-	-	-	120,000	120,000	120,000	205,369

- Pure IBNR, Incurred But Not Reported
 - Time lag between Date.of.Loss to reported date
- IBNER, Incurred But Not Enough Reserved
 - Different between case reserve to ultimate settlement

Section 3

Actuarial Models



Traditional approach

Limitations

- Traditional aggregated claim development technique, like
 - Bornhuetter Ferguson
 - Chain LadderDo not differentiate IBNR and IBNER
- Might develop old-age claim, even if those claims are closed
- Significant influence by case reserve, and do not model case reserve adequacy. Though use of both paid and incurred triangle help indirectly.
- Do not take into account time bar, limit of last reporting could occurred
- Not suitable for estimating XL reinsurance recovery, as layer deductible applied for each individual claim basis
- Difficult to Gross and Net reserve valuation which could take XL reinsurance into consideration

Schnieper Model

An alternative

- ASTIN Papers
 - Schnieper, R. (1991). "Separating True IBNR and IBNER Claims." ASTIN Bulletin 21(1): 111-127.
 - Huijuan Liu and Richard Verrall (2009), "Predictive Distributions for Reserves which Separate True IBNR and IBNER Claims." ASTIN Bulletin 39(1): 35-60.
- Traditional X-triangle split into
 - N-triangle, true IBNR
 - D-triangle, IBNER

D_{ij} : change in claims amount between development year i and year j

N-triangle: Pure IBNR Sample

Pure IBNR (Late Reporting Triangle)						
	1	2	3	4	5	6
1996	4,917,731	2,256,505	378,336	-	-	-
1997	8,357,348	1,103,468	21,420	-	-	-
1998	8,773,750	271,105	-	-	-	-
1999	13,647,300	1,165,606	-	-	-	-
2000	11,962,766	946,520	-	-	-	741
2001	8,197,573	1,221,882	-	196,624	-	-
2002	12,276,681	338,784	-	-	18,900	174,720
2003	20,463,067	912,740	84,000	-	21,336	-
2004	17,875,024	1,684,007	19,320	21,336	-	-
2005	10,642,052	2,859,743	35,709	-	-	-
2006	8,505,223	5,368,546	-	-	-	-
2007	12,163,506	7,507,322	-	38,640	-	-
2008	15,776,106	12,111,055	1,411,911	-	267,120	-
2009	24,699,515	28,428,136	891,235	-	-	-
2010	56,912,662	28,937,367	266,246	-	-	-
2011	51,180,142	39,718,978	-	-	-	-
2012	58,576,784	-	-	-	-	-
Observed	344,927,232	134,831,766	3,108,177	256,600	307,356	175,461
lamda	0.045452	0.022303	0.000645	0.000068	0.000099	0.000072

- N-triangle is exactly the same as traditional X-triangle on 1st development year
- Every claim will only appear in N-triangle once; 1st appearance
- Traditional X-triangle can be reconstructed from N-triangle and D-triangle

D-triangle: IBNER

Sample

Pure IBNR (Late Reporting Triangle)						
	1	2	3	4	5	6
1996	-	2,177,821	1,815,082	177,783	430,693	278,255
1997	-	1,793,168	2,322,282	606,487	(10,866)	625,773
1998	-	1,918,167	1,491,331	680,072	577,828	(306,299)
1999	-	2,450,125	(526,848)	1,279,891	964,100	2,068,518
2000	-	1,455,828	3,651,960	(172,724)	1,277,222	90,559
2001	-	1,197,270	1,889,406	3,308,711	931,064	1,704,798
2002	-	166,109	1,343,615	1,482,348	444,573	150,372
2003	-	(590,643)	1,735,596	1,476,927	1,881,828	2,530,530
2004	-	1,085,583	5,122,302	2,461,434	641,462	1,333,784
2005	-	3,592,397	6,473,759	825,922	755,263	11,910,496
2006	-	3,211,598	2,922,380	2,497,077	3,015,936	1,075,856
2007	-	1,010,668	3,552,984	6,325,381	1,628,049	506,832
2008	-	6,098,159	15,146,207	11,502,689	4,300,170	-
2009	-	5,510,457	17,947,666	11,343,391	-	-
2010	-	18,989,881	31,568,744	-	-	-
2011	-	18,525,440	-	-	-	-
2012	-	-	-	-	-	-
Observed		68,592,029	96,456,467	43,795,390	16,837,321	21,969,475
IBNER Exposure (all)		170,446,695	291,532,288	285,663,290	230,530,605	187,866,483
delta		24.0%	19.7%	9.1%	4.3%	7.0%
IBNER Factor		1.24	1.20	1.09	1.04	1.07

- D-triangle is an incremental triangle
- 1st year is always zero
- Expect to see the increment to be over (-) and under (+) and average to zero for perfect case reserving

Ultimate Claim Projection

Sample

Year	GNPI	Latest Rpt	IBNER Factor	IBNER Reserve	IBNR Factor	IBNR Reserve	Ult Claim
1996	1,000,000	120,000	1.0000	-	-	-	120,000
1997	1,500,000	180,000	1.0000	-	-	-	180,000
1998	2,000,000	240,000	1.0015	350	-	-	240,350
1999	2,500,000	300,000	1.0022	653	-	-	300,653
2000	3,000,000	360,000	1.0041	1,469	-	-	361,469
2001	3,500,000	420,000	1.0044	1,855	-	-	421,855
2002	4,000,000	480,000	1.0028	1,355	-	-	481,355
2003	4,500,000	540,000	1.0211	11,393	-	-	551,393
2004	5,000,000	600,000	1.0306	18,390	-	-	618,390
2005	5,500,000	660,000	1.0458	30,252	-	-	690,252
2006	6,000,000	720,000	1.0728	52,442	-	-	772,442
2007	6,500,000	780,000	1.0989	77,132	0.0001	513	857,645
2008	7,000,000	840,000	1.1754	147,318	0.0002	1,363	988,681
2009	7,500,000	900,000	1.2265	203,830	0.0003	2,082	1,105,912
2010	8,000,000	960,000	1.3384	324,866	0.0011	9,131	1,293,997
2011	8,500,000	800,000	1.6020	481,590	0.0369	313,402	1,594,992
2012	9,000,000	720,000	1.9857	709,722	0.1271	1,144,129	2,573,851
Total				2,062,617		1,470,621	

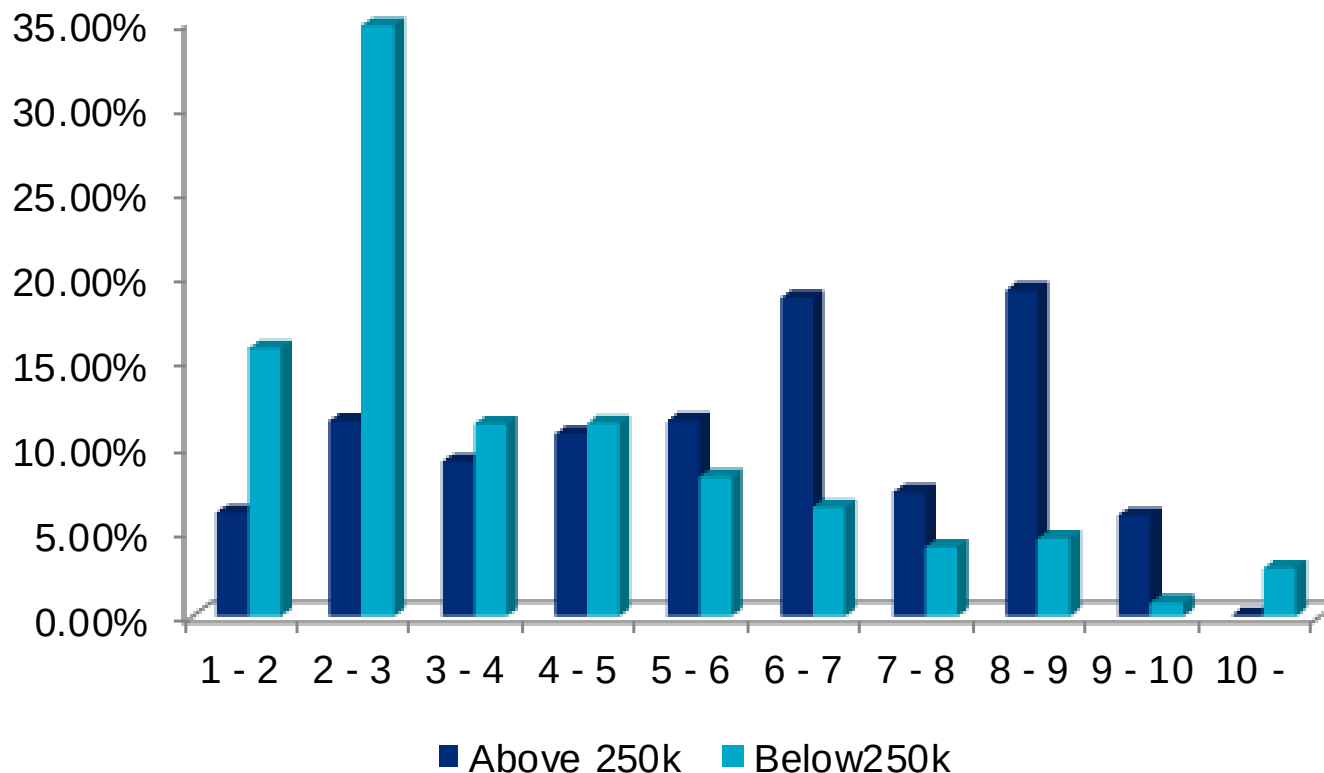
- Estimation is separated for IBNR and IBNER reserved
- Drilling down on IBNER component could bring insightful quantitative projection
 - Reclassification of claim type
 - Provide actuarial basis for setting initial case reserve

Ultimate Claim Projection

Individual Claim

- IBNER factor provide a reasonable basis for projecting individual claim
- Additional claim information like individual policy limit, deductible, claim status (closed/open) adjusted during the individual projection
- IBNER factor differ for each development year
 - claim payment pattern would be inferred, on aggregated basis
- Ultimate individual claim projection could be used for
 - XL reinsurance pricing
 - Gross/Net valuation after XL reinsurance
 - Adequacy of reinstatement/AAL

Payment Pattern



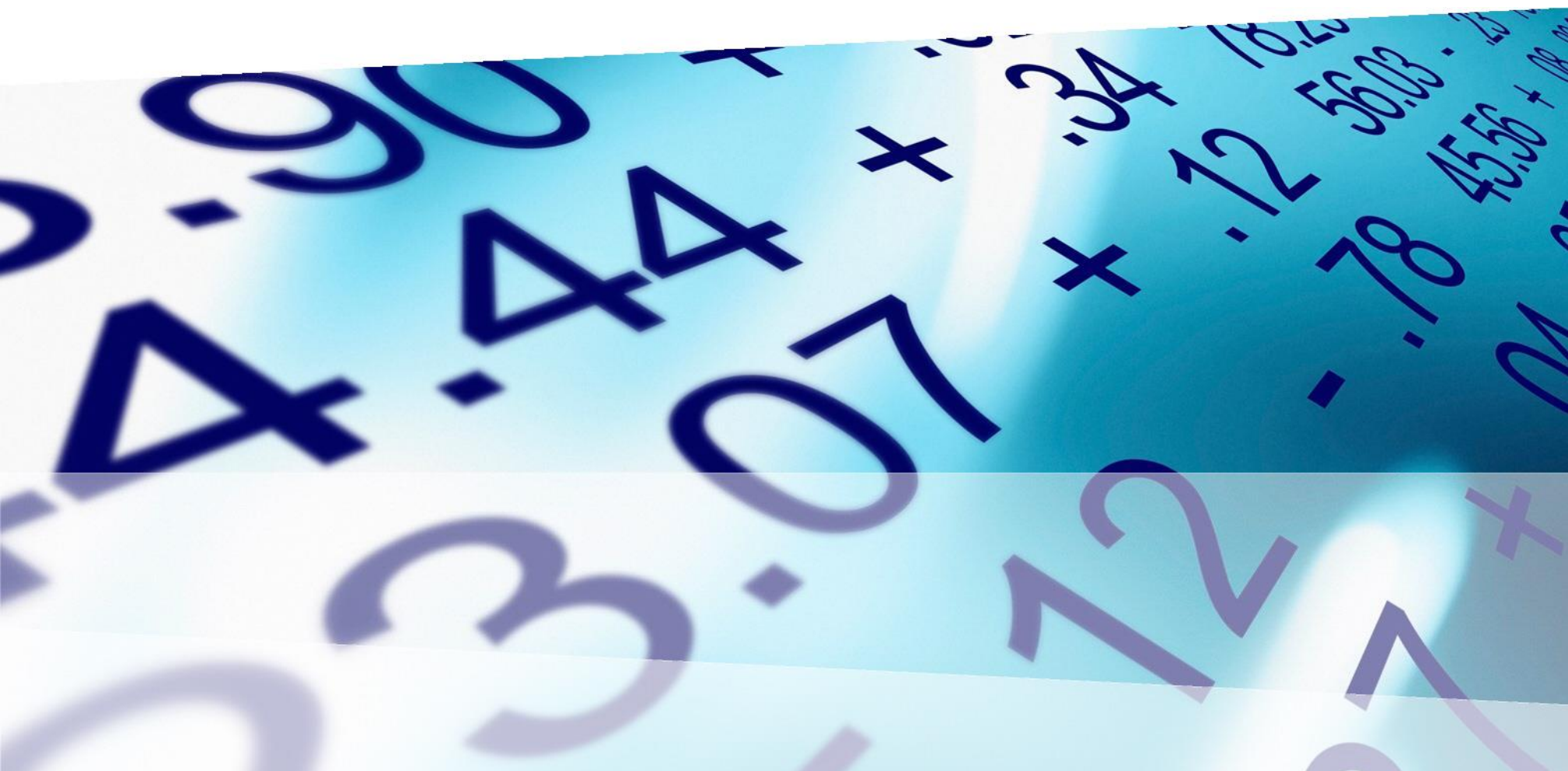
- Large claim paid slower
- Cash flow pattern is one of the significant driver that determined technical reinsurance premium

Benefits Schnieper Model

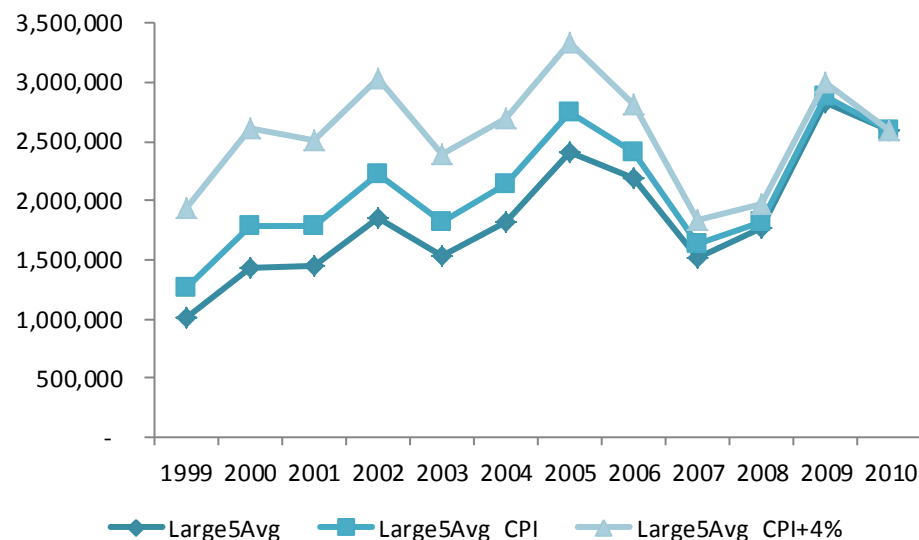
- Total IBNR split into Pure IBNR and IBNER component
 - Back testing : comparing year i with $i - 1$, we found a more stable projection
 - Less dependence on the quality of case reserve
- IBNER factor provide ultimate individual claim amount
 - Quantifying the impact of XL reinsurance on net retain liability
 - Provide the estimation of claim dependence reinsurance feature like reinstatement premium , swing rate, profit commission
- Pure IBNR projection
 - Provide an actuarial framework in estimating the Adequacy of AAL
- Predictive distribution (Huijuan Liu, 2009)
 - Provide closed form analytical formula for the uncertainty around central estimate.

Section 4

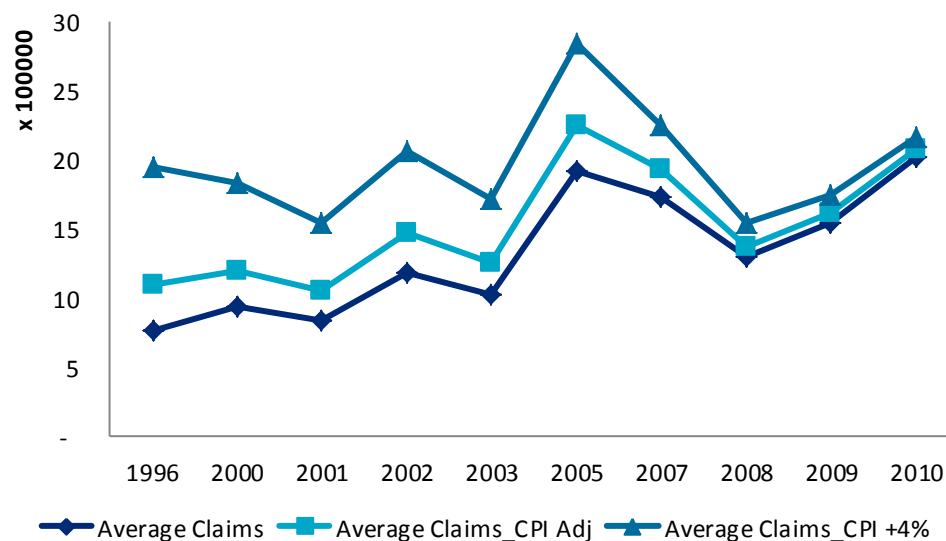
Market Benchmark



Claim Inflation



- Using sing two approaches
 - Average for the 5 largest claim per year
 - Average claim in excess of 750k per year



- Both suggest CPI+4% as a reasonable on-level factor
- Most CXL use CPI in the Indexation clause

Industrial IBNR Factor

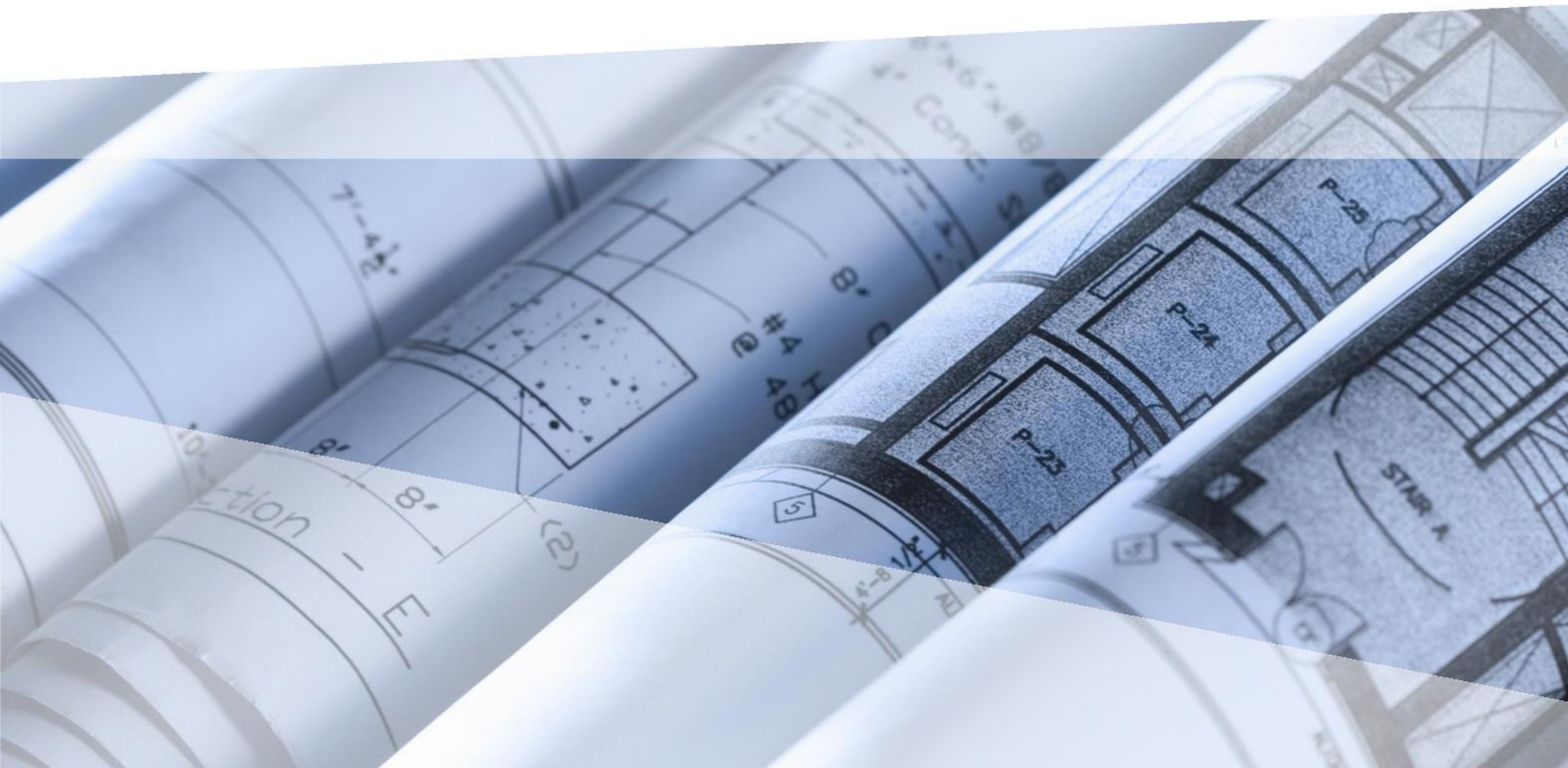
- D-triangle

	Development Year					
	1	2	3	4	5	6
min	0.001229	0.002015	0.000009	0.000011	0.000025	-
max	0.045452	0.022303	0.007335	0.002906	0.000664	0.005041
simple average	0.018327	0.013629	0.002306	0.000777	0.000314	0.001312
weight average	0.021748	0.017148	0.001150	0.000197	0.000343	0.000274

- The industrial factor served as a reasonableness check , and provide range for intelligent-guess

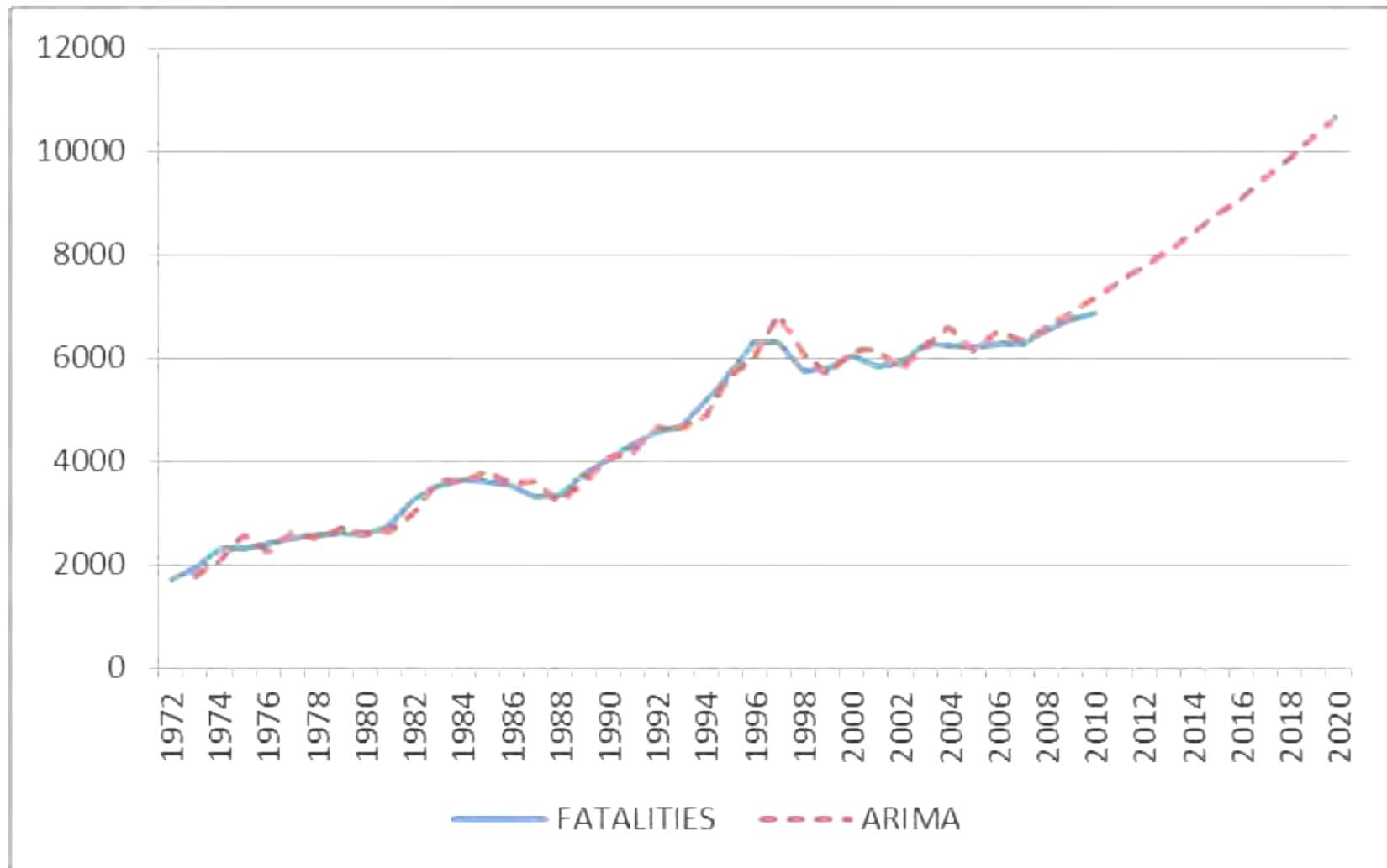
Section 5

Look into Future



Road Fatality Projection

--Malaysian Institute of Road Safety Research (MIROS)



2020 Projection

- Google Driverless Car



- Volve target to eliminate all-crash related injuries and death and eventually the elimination of car accidents altogether by 2020
- Will Auto Insurers Survive Their Collision with Driverless Cars?
 - Forbes March, 2013
- A Scenario: The End of Auto Insurance. What Happens When There Are (Almost) No Accidents
 - <http://www.celent.com/reports/scenario-end-auto-insurance>

Section 5

Concluding Comments



Concluding Remarks

- Introducing Schnieper Method to practicing actuary
- Malaysia benchmark statistics is presented
 - Super imposed inflation
 - Pure IBNR factor
- GC Analytics team in Singapore
 - Actuarial: 6, Catastrophe Modeling:3, Business Intelligent :3
 - Gross/Ceded/Net analysis on Combined Liability XL
 - IBNR/IBNER projection
 - AAL/Reinstatement adequacy analysis
 - Clash/stress testing on inflation risk
Asset (Bond) & Long-tail liability risk
 - MTPL Large Loss loading/Pricing

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