International Reinsurance: The Education of an American Actuary

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Agenda

- Importance of exposure to international markets & actuarial approaches
- Cultural differences
- Exposure rating and excess of loss rating: different perspectives
- Line of business studies
- Property reinsurance
- European motor
- Summary of lessons learned

Possible Reactions to My 90 Minute Session Time

Be kind…you still get almost 2 units of CPE credits!

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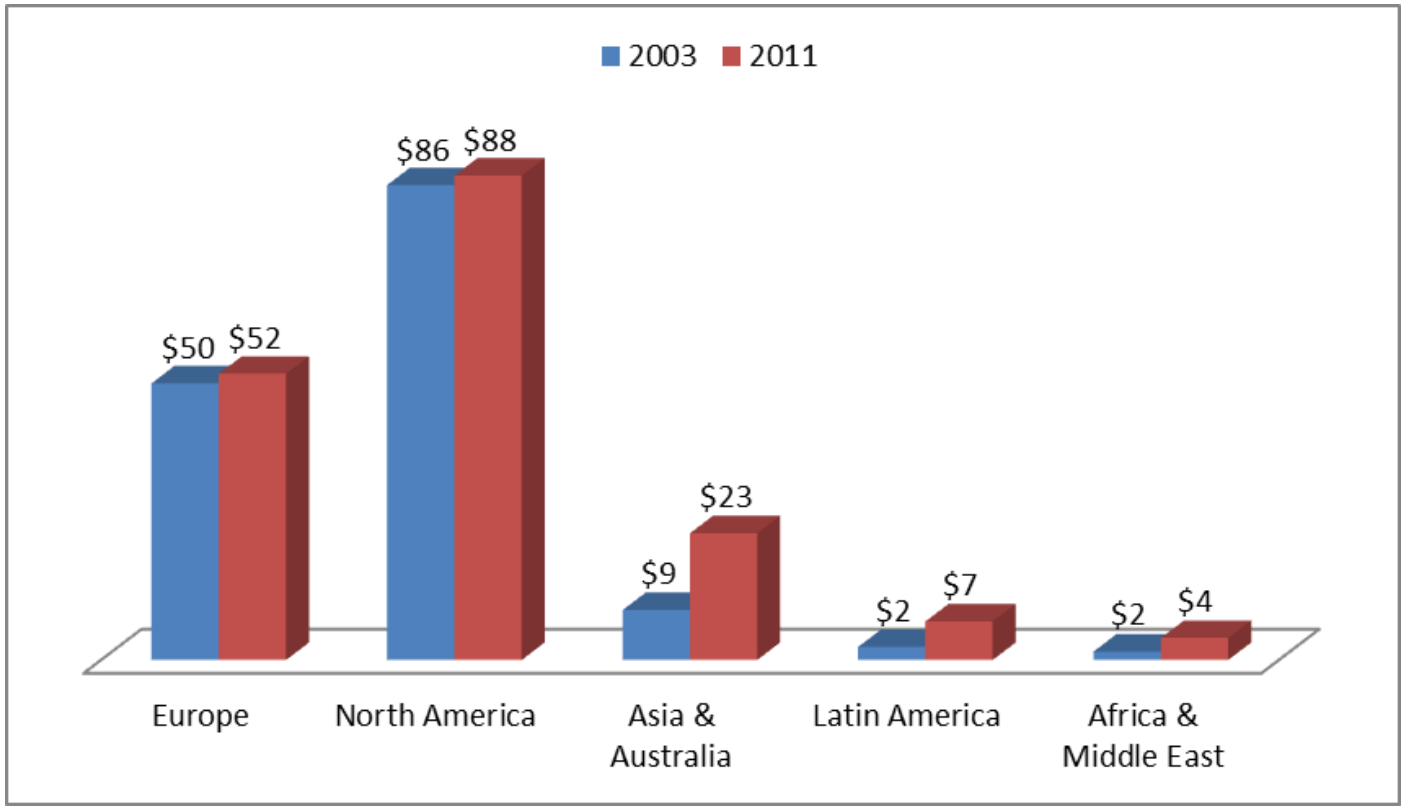
Importance of Exposure to International Markets
Reinsurance Mkt. Size & Growth by Ceding Company Region ($bil)



- Statistics are per the International Association of Insurance Supervisors (IAIS) 2003 & 2011 reports. The above includes life reinsurance.
- 2003: Global reinsurance market was $150 billion, non-life was $118 billion
- 2011: Global reinsurance market was $175 billion, non-life was $121 billion

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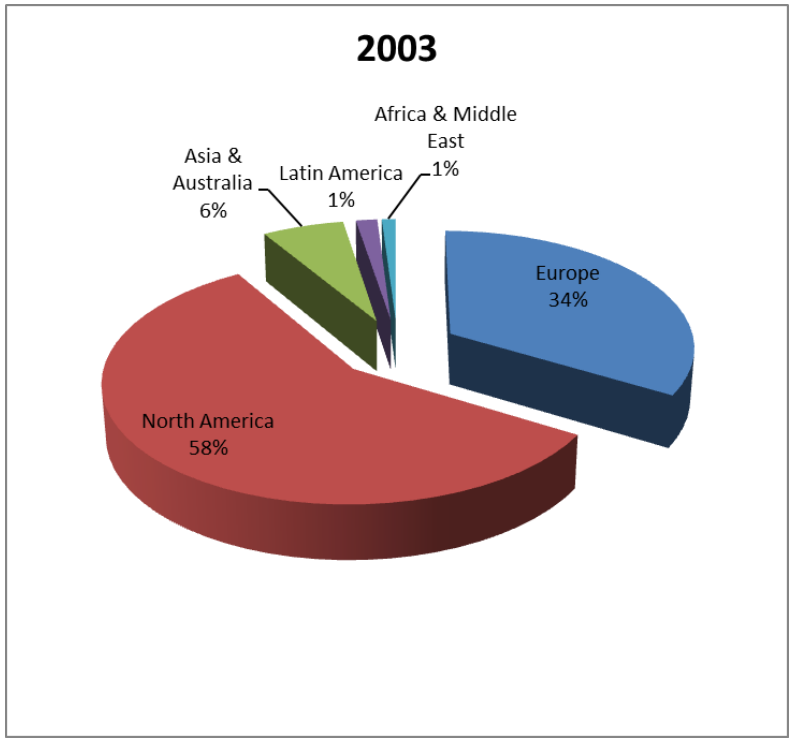
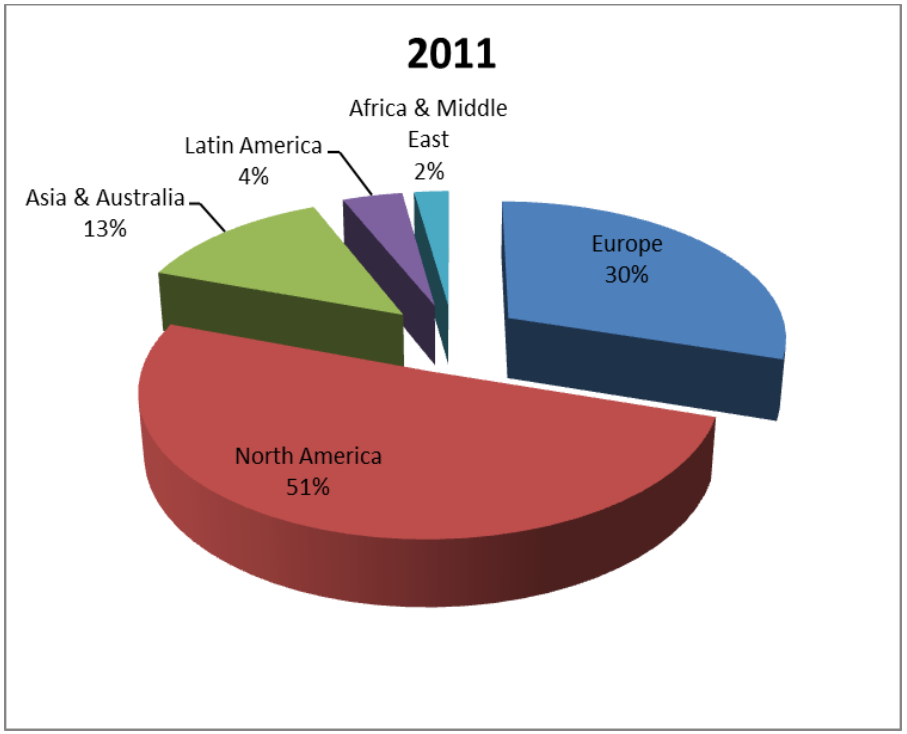
Importance of Exposure to International Markets
Reinsurance Market by Ceding Company Region: 2003 vs. 2011





- Statistics are per the International Association of Insurance Supervisors (IAIS) 2003 & 2011 reports. The above includes life reinsurance.
- North America and Europe's share of the world reinsurance market has shrunk. This trend will likely continue.

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Importance of Exposure to International Markets
Worlds Largest Reinsurers – 2011 Net Non-Life Premium in $mil

1	Munich	20,539	17	Mitsui Sumitomo	1,784	33	Alterra	787
2	Swiss	13,571	18	QBE	1,728	34	IBR - Brasil	671
3	Lloyd's	10,015	19	XL	1,726	35	Allianz	657
4	Berkshire	9,867	20	Odyssey	1,673	36	Platinum	652
5	Hannover	7,719	21	Caisse Centrale	1,618	37	Montpelier	624
6	Scor	4,650	22	Catlin	1,570	38	Allied World	570
7	Everest	4,109	23	Amlin	1,124	39	Flagstone	558
8	Transatlantic	3,860	24	Aspen	1,098	40	ACR	553
9	Partner	3,688	25	Validus	1,040	41	African Re	535
10	China Re	3,526	26	Ren Re	1,013	42	Ariel	526
11	Korean Re	3,043	27	Ace	979	43	Nippon Koa Sompo	510
12	General Ins Corp - India	2,413	28	Endurance	974	44	WR Berkley	430
13	Toa	1,962	29	Arch	952	45	Deutsche Ruck	414
14	Axis	1,953	30	White Mountains	916	46	American Ag	356
15	Mapfre	1,933	31	Generali	900	47	Central Re - Taiwan	301
16	R&V	1,871	32	Maiden	798			

- Most large reinsurers are owned and managed Europeans and Asians
- Even US managed companies tend to be mostly global in nature
- Total net premium of the top reinsurers is $123 billion
- Source: Best's Review, September 2012

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Importance of Exposure to International Markets
My History

- St. Paul Re
  - NY based international department
  - Credit and Surety pricing
  - Model development
- Risk Capital Re (Arch): International aviation and marine books
- GE Employers Re: Moving toward common rating models
- Endurance
  - Internal audits
  - Managing London pricing actuaries
  - New offices in Zurich and Singapore
  - Actuarial and underwriting growing pains
  - Rebuilding pricing models
  - Reserving

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Cultural Differences

- Knowledge of languages
  - American actuaries need to learn to love Google translator
- Different roles of account managers, underwriters and actuaries
- Account management approach “a mutual fund strategy”
- Underwriting and Claims audits are extremely rare outside the US
- Actuarial training (I’m not an expert on worldwide actuarial training)
  - CAS provides more specific property & casualty training than any society in the world
  - Some international actuaries take US exams
  - In some countries exams are not required, requirements are fulfilled via university training and work experience
  - UK exams are rigorous but not solely focused on property & casualty
  - European actuaries tend to have stronger math, language, and programming backgrounds. Some are less practical and business focused than US actuaries.
- Never make analogies to US business – at least to them

Cultural Differences – US Line of Business/Parameter Studies

- Available Data
  - ISO trend circulars and reinsurance package
  - NCCI data for workers comp
  - D&O Security Class Action – Cornerstone Research, NERA, Stanford, etc
  - US Statutory statement data services, such as SNL
  - CIAB and Marketscout rate change projections and commentary
  - Investor Relations Websites – Allstate (Homeowners & Auto frequency & severity trends)
  - Reinsurance submission data
- Endurance US studies – Other US reinsurers do similar work
  - Review of underwriting, claims & other qualitative issues impacting a line of bus
  - Determining default rate changes based on client and industry data
  - Review of frequency & severity trends based on ISO, NCCI and other outside data
  - Testing of selected trends versus industry and client loss ratios
  - Projecting loss ratios by sub-segment – identify better and worse areas
  - Test exposure rating curves by comparing to excess of loss experience

Cultural Differences
International Line of Business/Parameter Studies

- Challenges
  - No real equivalent to ISO and NCCI
  - Data sources similar to those that access US statutory data are generally not available
  - Industry exposure curves are not available.
  - Deal with multiple country/line of business combinations – biggest challenge
- Typical approach
  - "The US approach is a far more stable and reproducible method." European actuaries are more comfortable treating pricing as more of an art than a science – partly due to necessity.
  - Have default severity trends for property, sometimes add social inflation for liability
  - May have default rate changes by line of business
  - Frequency Trend: Less likely to analyze this issue, may use stabilization factors that combine rate change and frequency trend
  - Exposure/Market Curves:
    - Not always available for non-property lines
    - Can be based on judgment and experience
    - Focus more on extrapolating up from working layers, using curve fitting, exposure rating, and market curves to analyze if selections are appropriate

Cultural Differences
Sources of Data

- Company Websites: Triangles from many companies (Partner), some publish rate changes by line (Amlin),
- Market reports (Swiss Re, Munich Re, Aon, Carpenter, and Willis)
- Economic data: Eurostat, IMF, OECD
- Insurance Associations: FFSA (French Insurance Association), Insurance Europe (CEA)
- Government Agencies: Transportation departments – auto premium, units, frequency
- Axco
- Reinsurance submission data

Cultural Difference: Renewal Seasons

- Reinsurance renewal seasons are insanely hectic during 1/1 renewal season in Europe. Sample 1/1/2013 renewal season statistics by office

	Programs Priced	Programs priced per FTE Actuary	Bound Premium	Bound Premium per Program Priced
US	80	13.5	$ 150,000,000	$ 1,875,000
London	63	20.5	$ 30,000,000	$ 476,190
Singapore	84	42.0	$ 26,000,000	$ 309,524
Zurich	268	45.0	$ 84,000,000	$ 313,433

- Impact on underwriting:
  - Need very quick turnaround time on referrals to the US
  - Expect key issues to be discussed at pre-renewal meetings
  - Expect actuaries to do pre-pricing
- Impact on pricing: Limits peer reviews. Attempts not to price business are difficult.
- Impact on system needs: Quick turnaround time, real time rollups, & strong preference for programmed models versus Excel

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Cultural Differences: What they think of us
European view of US business culture and presentation style

- Directness:
  - "American speakers come to the main point quickly"
  - "The US is known for the use of the executive summary…'just give me the bottom line'"
- Informality:
  - "The use of first names is common. Individual from a more formal culture are surprised by the ease with which people use first names with superiors"
  - "Another part of this informality is a tendency to feel comfortable discussing private issues with a variety of individuals"
- Avoid Ambiguity: "Many people in the US see issues in black and white"
- Practicality/logic: "Action-oriented Americans prefer the practical and specific and lack patience with the abstract and general"
- Use of Emotions and Humor: "It is common to show a some anger or pleasure…In addition, Americans use humor often. It is common to begin a speech with a joke."
- Visual: "Americans generally enjoy presentations with charts, graphs, and other visuals."

*.The above is per an INSEAD executive education program.

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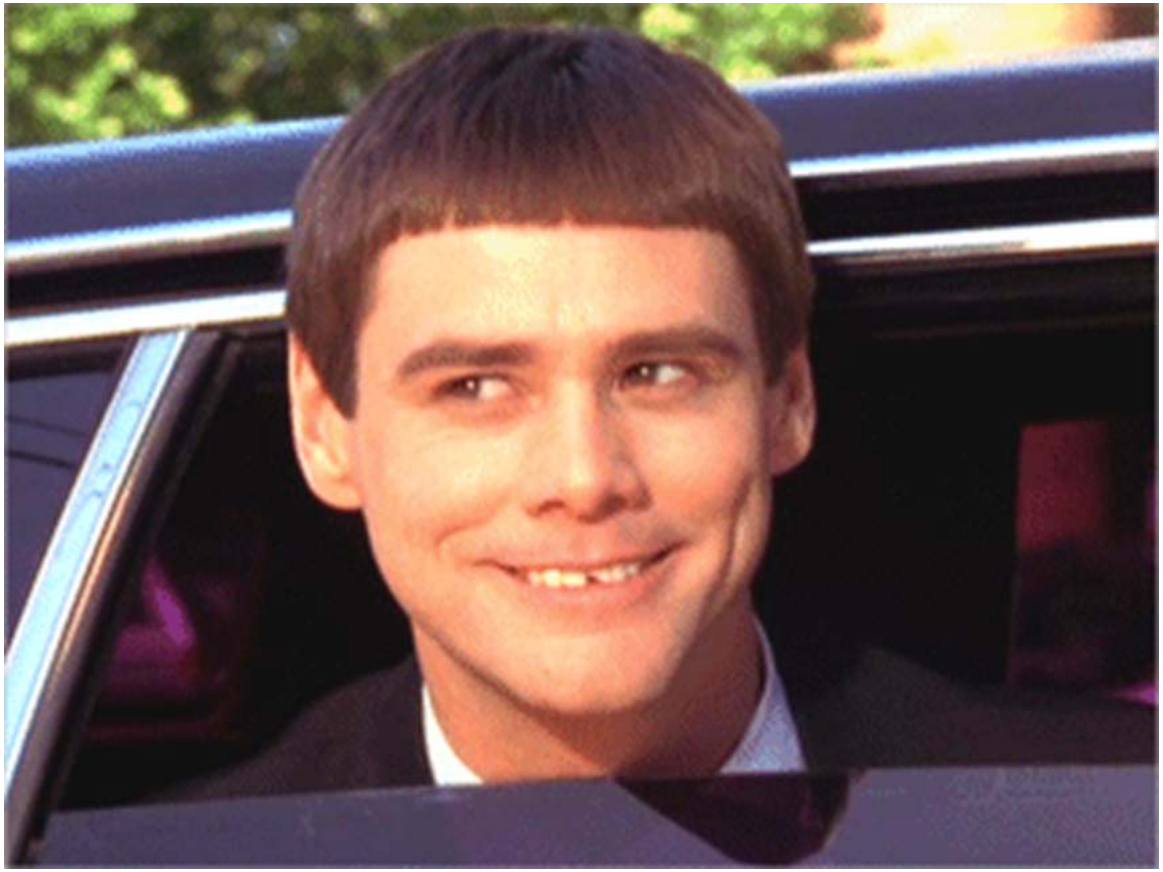
What they think of us: a summary



I’m kidding of course…

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Cultural Differences
Tips for Americans dealing with Europeans

- Informality and humor: Most Europeans seem to enjoy this about Americans.
- Ambiguity: You need to show that you are ok dealing with grays. You need to get nuance
- Europeans presentations often start with background information
  - "This is the size of the French insurance market, here's how it is split by line of business, these are some mostly irrelevant changes in French law, etc."
  - Often feel a need to show academic or subject knowledge before getting to the point.
- They sometimes enjoy debating for sport (especially the French) don't get offended.
- To gain any credibility, you must demonstrate that you know the specifics of the business under discussion. Analogies to similar situations in the US undermines your credibility

Excess of Loss Rating Approaches

Standard Excess of Loss Rating Approach – US Approach

- Sample Program: $1 million xs $1 million, $3 million xs $2 million, $5 million xs $5 million
- Project gross loss ratio to be used in exposure rating
- Project experience and exposure loss cost (burn) for each layer
- Weigh experience and exposure loss costs using default credibility weighting approach

	(A)	(B)	(C)	(D)	(E)	(F)
	Limit	Attachment Point	Experience Loss Cost as % of Subj Premium	Exposure Loss Cost as % of Subj Premium	Credibility Weight to Experience	Selected Loss Cost as % of Subj Premium
First Layer	1,000,000	1,000,000	5.0%	6.0%	70.0%	5.3%
Second Layer	3,000,000	2,000,000	4.0%	3.0%	40.0%	3.4%
Third Layer	5,000,000	5,000,000	0.0%	1.5%	20.0%	1.2%

Column F: Selected Loss Cost = Experience x Credibility + Exposure x (1 - Credibility)

- Advantages:
  - Strong focus on exposure rating
  - Disciplined approach, especially if a default method is selected to weigh experience and exposure loss costs

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Standard US Excess of Loss Rating Approach – European Critique

- Less confidence in exposure rating - Europeans often do not have reliable industry exposure curves, especially for casualty
- Americans treat the layers as if they are completely independent. When selecting the 5x5 layer burn it doesn't matter to them that experience for the 3x2 layer was worse than exposure
- American approach can produce loss costs with an illogical shape – see below

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Limit	Attachment Point	Experience Loss Cost as % of Subj Premium	Exposure Loss Cost as % of Subj Premium	Credibility Weight to Experience	Selected Loss Cost as % of Subj Premium	Selected Loss Cost as a % of Exposure (Experience Mod)
First Layer	1,000,000	1,000,000	5.0%	6.0%	70.0%	5.3%	88.3%
Second Layer	3,000,000	2,000,000	4.0%	3.0%	40.0%	3.4%	113.3%
Third Layer	5,000,000	5,000,000	0.0%	1.5%	20.0%	1.2%	80.0%

Column F: Selected Loss Cost = Experience x Credibility + Exposure x (1 - Credibility)
Column G: Loss Cost as a % of Exposure = Selected Loss Cost / Exposure Loss Cost

- If the client needed an alternative structure, the actuary would have to re-price everything.
- Since it is not a frequency/severity approach, pricing loss sensitive features (such as profit commissions or annual aggregate deductibles) required additional work

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Typical European Excess of Loss Rating Approach

- Project an average number of claims above the program attachment point ($1 million) or lower if the data is not sufficiently credible
- Fit a severity curve to losses in excess of the selected attachment point, consider modifying curve shape based on selections for similar business
- Use above to simulate losses to selected layers in excess of the attachment point
- Advantages
  - Very easy to price alternative structures
  - Can use above simulation to price loss sensitive features (Profit Commissions, AADs, etc.)
- Critique by US actuaries
  - Completely ignores the client's exposure (when pricing a $5 million xs $5 million layer, isn't it important to reflect what percent of their business has limits above $5 million?)
  - Experience is usually not sufficient to price middle to high layers, i.e. pricing a layer that the market prices to have a loss once every 10 years with 5 years of data
  - Ignores industry frequency of large losses
  - Significant flexibility in selecting curve parameters – can easily back into market price
  - Curve fitting usually ignores the impact of loss development

Blending the US and European Approaches – Best of Both Worlds

- Exposure rating can be based on the experience of lower reinsurance layer; so, exposure rating can be done without client gross loss ratios – "**exposure relativity method**"

	(A)	(B)	(C)	(D)	(E)	(F)
	Limit	Attachment Point	Experience Loss Cost as % of Subj Premium	Exposure Loss Cost as % of Subj Premium at a 100% LR	Exposure Loss Cost as % of Base Layer	Exposure Loss Cost Using Experience of Base Layer
Base Layer	500,000	500,000	**7.0%**	15.0%	100.0%	7.00%
First Layer	1,000,000	1,000,000	5.0%	10.0%	66.7%	4.67%
Second Layer	3,000,000	2,000,000	4.0%	5.0%	33.3%	2.33%
Third Layer	5,000,000	5,000,000	0.0%	2.5%	16.7%	1.17%

Column F: Exposure Loss Cost = Experience for Base Layer x Exposure Loss Cost as a % of Base Layer

- Experience and Exposure rating can be expressed as an excess frequency curve
  - **Excess Frequency as a % of subject premium excess of $5 million, equals the loss cost for a $1 xs $5,000,000 layer**
  - Can easily fit curve to interpolate between selected burns (we use a Pareto)
  - Can use a default approach to weigh experience and exposure excess frequency curves

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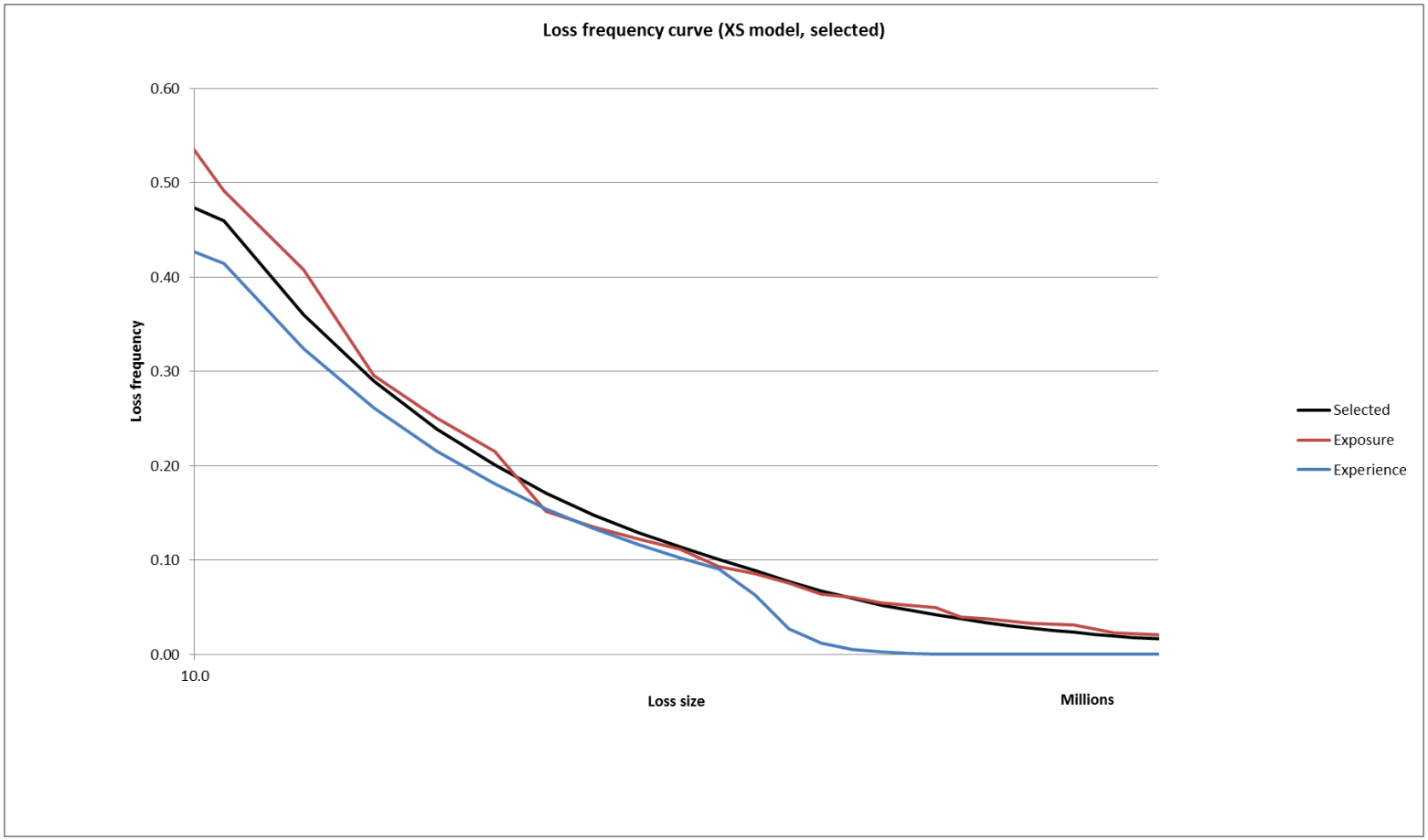
Blending the US and European Approaches
Excess Frequency Perspective



- Could easily add a Pareto or other European style frequency/severity indication to the above.

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Blending the US and European Approaches
Advantages and Requirements of Excess Frequency Approach

- Suggestions for smoother application
  - Experience Rating: Avoid varying weights by year for different layers, i.e. don't pick the five year average for the first layer and the all year average for the next one
  - Always price the top layer, i.e. do not attempt to extrapolate beyond the selected excess frequency curve
  - Credibility weighting between experience and exposure should not ignore the experience of the prior layer
    - Suggested approach: "An Alternative Approach to Blending Experience and Exposure Rating Analyses" presented by Michael Caulfield at the 2009 CAS Reinsurance Seminar
    - Approach blends the experience and exposure relativities (decay) to the prior layer
- Advantages
  - Multiple alternatives can be priced quickly
  - Easily produces program and contract aggregate distributions and analyzes loss sensitive treaty terms
- Special thanks to Simon Niemann, Markus Knecht, and Pierre Balthazard of our Zurich & Singapore offices, who did a lot to educate me, and who appreciate exposure rating.

Blending the US and European Approaches
Alternative Credibility Method (per Caulfield presentation)

			Traditional Credibility Weighting Method					Suggested Alternative Method				
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
	Limit	Attachment Point	Experience Loss Cost as % of Subj Premium	Exposure Loss Cost as % of Subj Premium	Credibility Weight to Experience	Selected Loss Cost as % of Subj Premium	Selected Loss Cost as a % of Exposure (Experience Mod)	Experience Relativity to Prior Layer	Exposure Relativity to Prior Layer	Selected Relativity to Prior Layer	Selected Loss Cost	Selected Loss Cost as a % of Exposure (Experience Mod)
First Layer	1,000,000	1,000,000	5.0%	6.0%	70.0%	5.3%	88.3%				5.3%	88.3%
Second Layer	3,000,000	2,000,000	4.0%	3.0%	40.0%	3.4%	113.3%	80.0%	50.0%	62.0%	3.3%	109.5%
Third Layer	5,000,000	5,000,000	0.0%	1.5%	20.0%	1.2%	80.0%	0.0%	50.0%	40.0%	1.3%	87.6%

Column J: Selected Relativity to Prior Layer = Experience Relativity x Credibility to Exper + Exposure Relativity x (1 - Credibility to Exper)
Column K: Selected Loss Cost = Prior Layer Selected x Selected Relativity to Prior Layer
Column L: Selected Loss Cost as a % of Exposure = Selected Loss Cost / Exposure Loss Cost

The above method more appropriately considers experience to the prior layer and produces a smoother indication.

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Property

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Differences in Pricing Property

- Gross loss data is almost never provided when rating excess of loss treaties – see the exposure relativity method
- Rate monitoring is rarely available – industry sources are also not as good
  - Sometimes get historical limit profiles – can compare average rate by size of risk
- UK & Marine Issue: Often unclear if historical & prospective premium are gross or net of original commission. If historical premium is gross of commission & premium ceded to reinsurers is net of original commission, the loss ratio will be understated without adjusting.
- "Losses can never be above the TIV"
- "ISO PSOLD curves don't apply to our business, because they are American"
  - Alternatives are ancient Swiss Re curves and Lloyd's scales

Differences in Pricing Property - 2

- Limit Profiles
  - Often not sufficiently refined – designed for underwriters not actuaries
  - Per policy versus location
  - EML/PML profiles
  - Do they include business interruption?
  - How much shared & layered business? Attachment point profiles?
  - Must ask these questions
- Clean-cut treaties
- Engineering
- Programs can cover multiple countries

Differences in Pricing Property
Cat Exposure in Working Layer Business

- Often do not get cat modeling data for per risk excess of loss treaties
- If you get cat data for per risk treaties, it is rarely on a location level basis
- Best solution when data is lacking – determine gross cat loss ratio and allocate losses to layer using exposure rating
- Monitoring aggregates can be difficult
- Multiple countries are often covered, global covers are common
  - Watch for US exposures
  - Cat data is often not provided for all zones
- Cat models outside the US are often not as well funded or as good
- Flood is a major exposure, but…
  - It is nearly impossible to accurately model it without location level data
  - Flood & tsunami are only occasionally covered by the commercial cat models

Top Ten Fresh Water Flood Losses in History
Swiss Re Sigma 2/2012

	Country	Insured loss, USDm, at 2011 prices	as a % of country's property premiums	as a % of country's non-life premiums	Insured loss, as % of GDP
July –Nov 2011	*Thailand*	*12,000*	*1846%*	*204%*	*3.4%*
Aug 2002	Germany & Czech Republic	2,886	20%	3%	0.1%
Jun 2007	United Kingdom	2,697	12%	2%	0.1%
Aug 2005	Switzerland	2,444	76%	12%	0.6%
Jan 2011	*Australia*	*2,255*	*24%*	*6%*	*0.2%*
Jul-Aug 1997	Poland & Czech Republic	2,241	213%	42%	0.7%
Jul 2007	United Kingdom	2,158	9%	2%	0.1%
Dec 2010	*Australia*	*2,114*	*27%*	*6%*	*0.2%*
Apr 1973	United States	1,873	5%	1%	0.0%
Jun-Aug 1993	United States	1,600	3%	0%	0.0%

- Thai Floods
  - Insured losses dominated by losses to foreign commercial entities
  - Japanese Interests Abroad (JIA) were particularly hard hit
  - Often no occurrence limit on JIA coverages
  - Supply chain & contingent business interruption significantly contributed to the losses
- 2011 Japan EQ had insured loss of $36 billion, much of it due to tsunami

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European Motor Excess of Loss

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International Casualty – General Comments

- Liability climate and severities are usually tamer than in the US
- Coverages are often broader and rates are usually lower
  - Products recall, financial institutions E&O, multiyear policies in some areas are more common
- Be aware of US exposures
  - Can be US subsidiaries of foreign companies
  - International approach can underprice these exposures and provide overly broad coverage
- Local liability issues can arise. Need local underwriting and claims expertise

International Casualty
Dealing with a lack of industry exposure curves

- Typical approach: “Experience and guessing”
- Riebesell Curves:
  - ILF (Limit) = (Limit / Base Limit usually 1 mil) ^ Alpha, where $0.25 \leq \text{Alpha} \leq 0.75$
  - If Alpha is 0.25, ILF (2 million) = (2 mil / 1 mil)^0.25 = 1.19
  - Usually based on judgment
- Sometimes develop exposure curves based on excellent work
- A good approach
  - Start with apriori exposure curve based on judgment or what has been used before
  - Compare an apriori exposure model output to excess of loss experience over multiple clients & layers
  - Modify initial curves until a good match is achieved

International Casualty – Indexation Clauses

- Used for most excess of loss contracts
- Concept: adjust treaty attachment points and limits to reflect inflation
- Typically based on wage inflation
- Types of Indexation:
  - Full Indexation – from treaty inception
  - Severe Inflation Clause (SIC) – excess inflation from when the cumulative index reaches a threshold
  - Franchise – from treaty inception only applies when the index reaches an agreed threshold
  - All indexation provisions are applied to incremental paid loss.
- How to reflect in pricing
  - Determine an incremental payout pattern for the layer
  - Based on estimated future inflation, estimate the value of the index for each point
  - Calculate weighted average index using the incremental payment streams
  - Determine effective limit and attachment point by multiplying each by the average index
  - Price treaty based on the indexed retentions

International Casualty – Applying an Indexation Clause

	Nominal Layer	Projected Average Index	Effective Layer - Price Treaty Based on these
Limit	3,000,000	**1.27**	3,821,159
Retention:	2,000,000	**1.27**	2,547,439

Selected Future Wage Inflation: 4.0%

Years from Inception	Cumulative % Paid for Layer	Incremental % Paid to Layer	Full Index	Severe Inflation Clause (10% threshold)	Franchise (10% threshold)	Index Specified in Sample Treaty - Full
1	0.0%	0.0%	1.04	1.00	1.00	1.04
2	5.0%	5.0%	1.08	1.00	1.00	1.08
3	20.0%	15.0%	**1.12**	**1.02**	**1.12**	1.12
4	35.0%	15.0%	1.17	1.07	1.17	1.17
5	45.0%	10.0%	1.22	1.12	1.22	1.22
6	55.0%	10.0%	1.27	1.17	1.27	1.27
7	65.0%	10.0%	1.32	1.22	1.32	1.32
8	80.0%	15.0%	1.37	1.27	1.37	1.37
9	90.0%	10.0%	1.42	1.32	1.42	1.42
10	100.0%	10.0%	1.48	1.38	1.48	1.48
		100.0%	Index Wtd on Inc. Payments to Layer:			**1.27**

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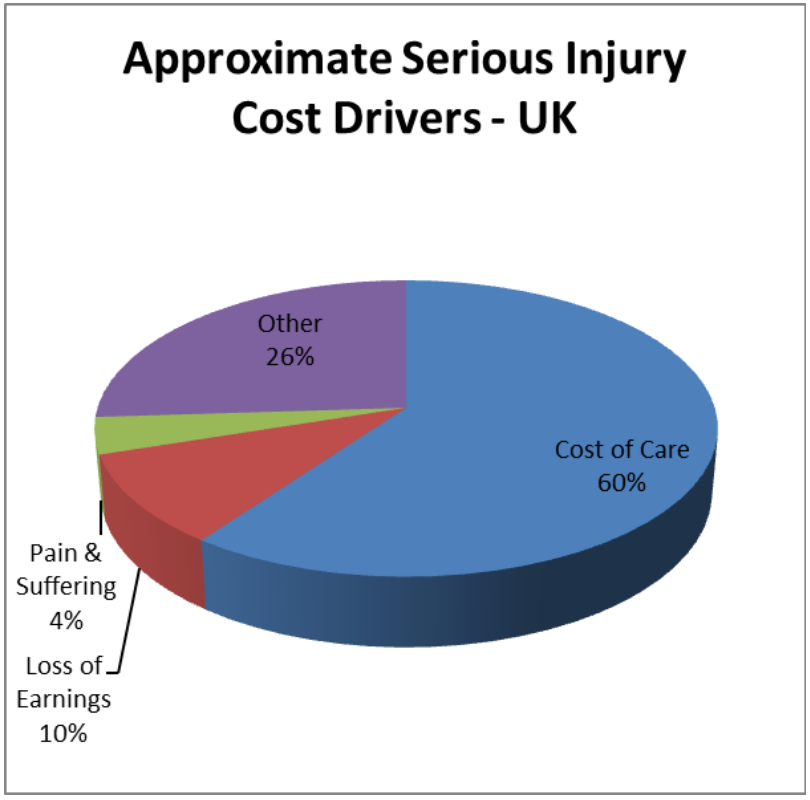
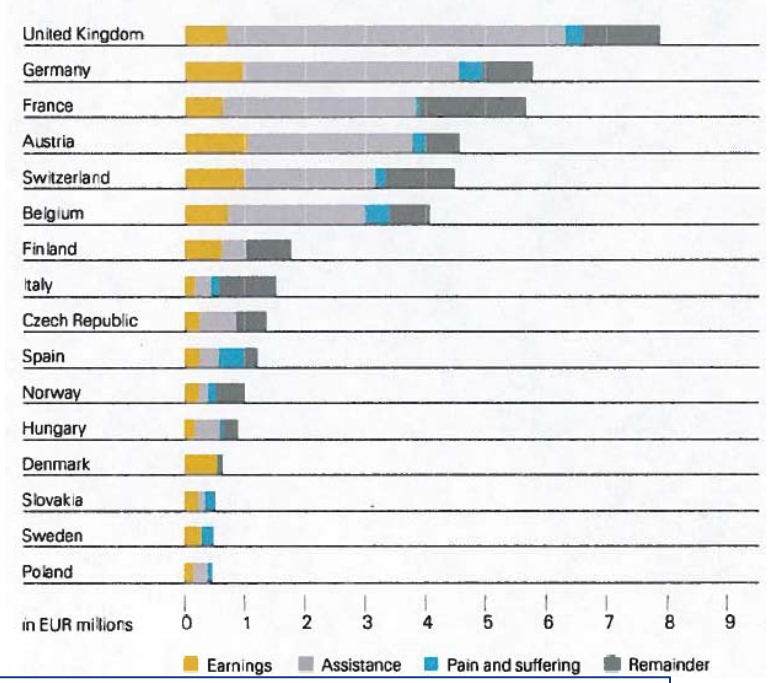
European Motor Overview

- Typical US Personal Auto Limit – NY: $25,000/$50,000 for injury, $50,000/$100,00 for death, $10,000 for property damage liability
- European Minimum Auto Limits:
  - UK – Bodily Injury is unlimited, PD: 100 million GBP per policy, 300 million GBP per event
  - France – Bodily Injury is unlimited, PD: 28.5 million Euro per policy
  - Germany – Bodily Injury: 8 to 15 million Euro per person, 100 million Euro per event
- Reinsurance Limits: In countries where BI is unlimited, top reinsurance layer is unlimited
- EU Fifth European Motor Directive: Minimum BI limits of 1 million Euros per victim 5 million per accident
  - All countries required to be at these minimum limits by the end of 2012
  - Italy: Minimum limits increased from 775,000 to 2.5 million Euros in 2010. Increased again in mid 2012 to 5 million Euros. Using experience to price excess layers will likely understate the ceded loss cost
  - Green Card Exposure

European Motor Serious Injury Statistics



Estimated 2006 level loss for 30 year old quadriplegic with 2 kids & average income



- Cost of care refers to home based nursing care. Hospital & physician services are typically provided via nationalized medical plans
- "Other" costs include costs of adaptation & third party pain and suffering
- Estimated serious injury losses by country are per a 2007 Swiss Re motor study

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European Motor Overview – France

- Largest Claim (per our underwriter): 15 million Euro (single person loss)
- Loss Settlements: Annuities increased for wage inflation.
- Reserves discounted using specified int. rates, mortality, and inflation assumptions
- **Consolidation** – The time when a claim is considered stable. Per a 2008 Munich Re study consolidation is achieved by the 4th year in 36% of cases and 80% of consolidations take place somewhere in the 5th thru 16th year and that 2% still remain open until the 20th year
- Commutation:
  - Occurs a specified number of years after consolidation.
  - Most contracts specify that commutation will occur and specify interest & mortality
- Special Issue: Interest rates used to discount reserves have decreased. Unless corrected, seems like a huge amount of loss development
  - Solution: Client's often give triangles with discounted case reserves restated to current interest rates
  - Attempt to make a manual correction to historical case reserves

European Motor Overview – Key Information by Country Needed

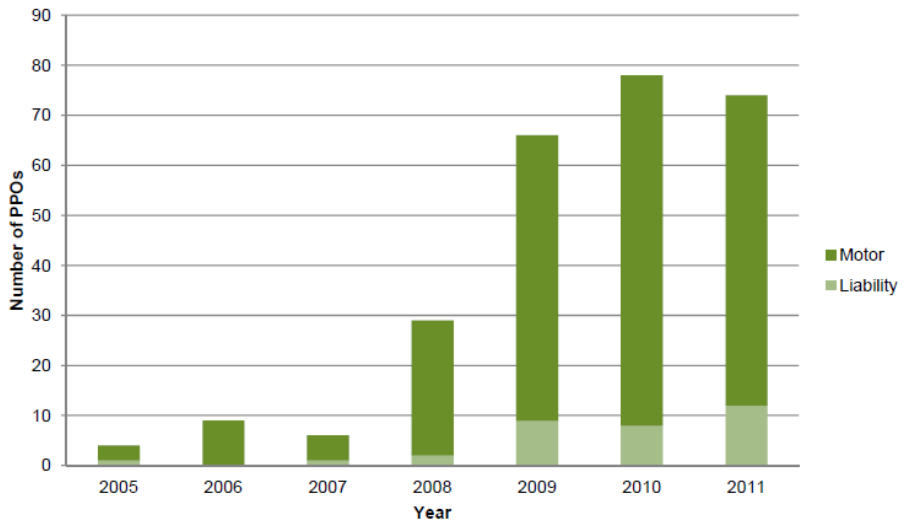
- Claim settlement: Lump sum or annuity?
- What are the minimum required limits, have they changed recently in a way that would mitigate the value of past experience for pricing?
- Reinsurance claim settlement: Does contract or custom require commutations, if so make sure you understand the terms
- Are case reserves discounted? Is layer loss development distorted by changes in interest rates?

European Motor Overview – UK

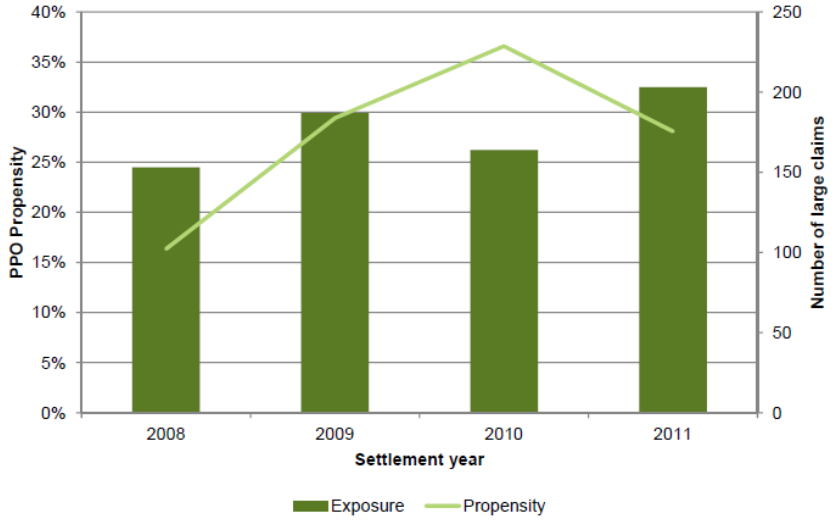
- Largest Claim: 42 million Euro (Selby rail crash), 20 million Euro (single person loss)
- Loss Settlements:
  - Had been nearly all lump sum settlements – insurer liability extinguished at payment
  - **Ogden Tables** provide a multiplier reflecting mortality & interest rates of 2.5% above inflation
  - Selected Ogden Table factor based on impaired mortality, for example, a 25 year old seriously injured may be deemed to have a life expectancy of a 45 year old
  - Lump Sum Settlement = Annual Cost x Ogden Table Multiplier
- Big Changes: PPO's
  - Courts Act of 2003 gave court power to impose annuity (PPO's) instead of lump sum settlements
  - PPO's did not become common until a few appeals rulings in 2008 (Thompstone)
    - Also established use of ASHE 6115 care cost workers index for cost of care inflation rather than standard wage index

Increasing PPO Propensity

Number of claims settled



Propensity – large claims



Exhibits are per the "Update from the PPO Working Party" presented at the 2012 GIRO Conference. It is based on data provided by 16 large UK insurers

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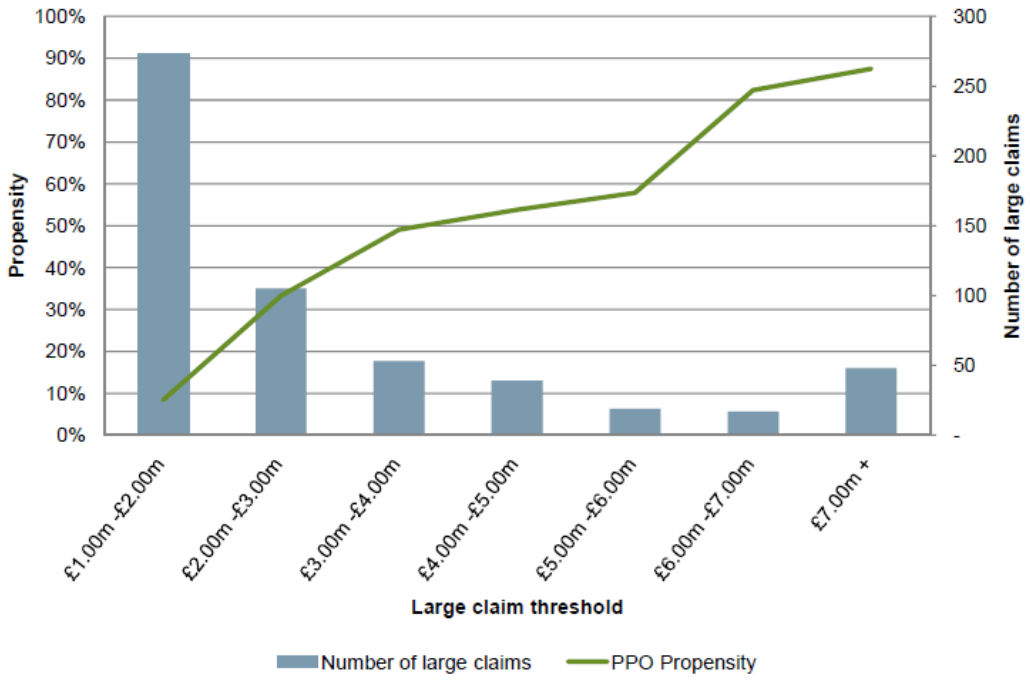
PPO Propensity Increases by Size of Claim

Propensity by large claim threshold



- Exhibit is per the "Update from the PPO Working Party" presented at the 2012 GIRO Conference. It is based on data provided by 16 large UK insurers
- Large claim threshold is based on the lump sum equivalent
- Impact of PPO's is greater for higher reinsurance layers

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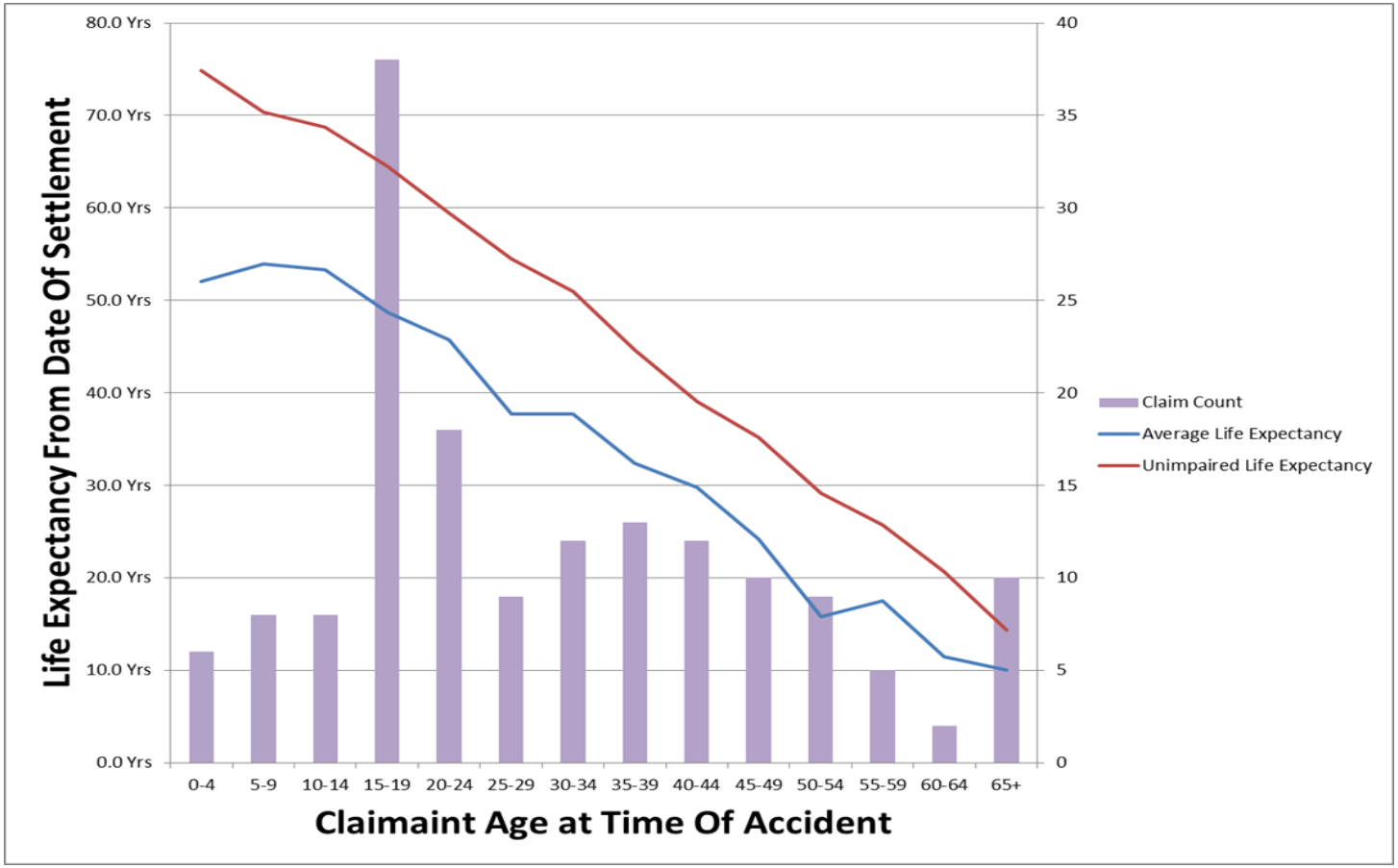
PPO Claims – Length of Payment Period



- Data is per the GIRO PPO Working Party
- Approximately 90% of PPO settlements are for brain and spinal injuries

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UK Motor PPO Issue Summary

- The problem
  - Ogden tables use interest rate of 2.5 points above inflation, insurers can't earn that today. Even on a discounted basis, that is an economic loss to insurers
  - P&C insurers and reinsurers are assuming significant mortality & inflation risk
  - Insurance carriers are generally unwilling to agree to commutation
  - Reinsurers that don't discount typically experience large underwriting losses
- Quantifying the Impact
  - We have a data set of 267 PPO claims
  - Data includes age of claimant, life expectancy at time of settlement, initial payments, annual PPO payment prior to inflation, etc.
  - (A) Determine Lump Sum Cost
  - (B) Determine cost of a PPO settlement based on the above
  - Vary individual inflation & mortality assumptions to add variability
  - Compare (B) to (A) to get the undiscounted cost multiple
  - Overall, we estimate that PPO's increase ground up loss costs by a factor of 2.5 to 3

Special thanks to Matt Dobrin & Paul Figg who did this great work.

Summary of Lessons Learned

Final Comments

- Becoming familiar with non-US actuarial approaches and markets is not really a choice
  - Employers are becoming more global
  - The US market is shrinking as a percent of the world's insurance and reinsurance markets
- Our actuarial tools and approaches improved due to the input (insistence) of our European colleagues
- International markets provide diversification from the two major company killers: US liability and US catastrophe exposure
  - But plenty of dangerous areas outside the US as well
- Data and industry parameters are less available outside the US.
  - Provides more opportunity to do interesting and ground-breaking work

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