Healthcare Trend – Old Problem, New Approach

CLRS – Las Vegas, 2011

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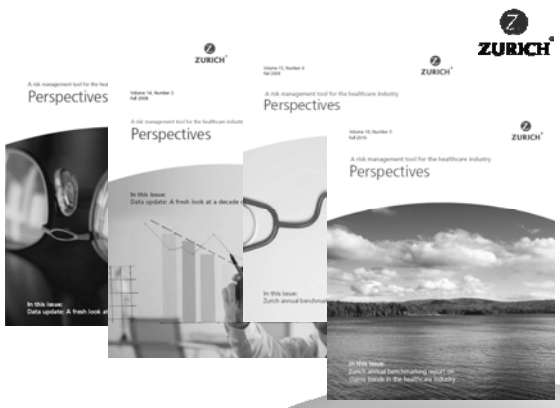
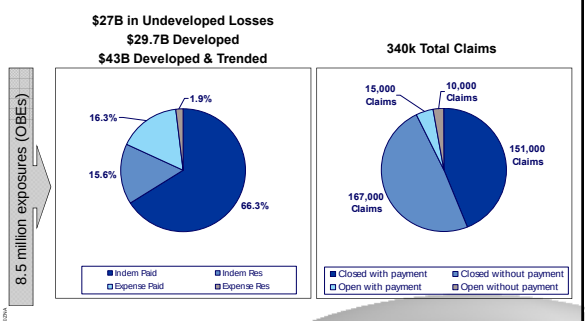
Zurich North America

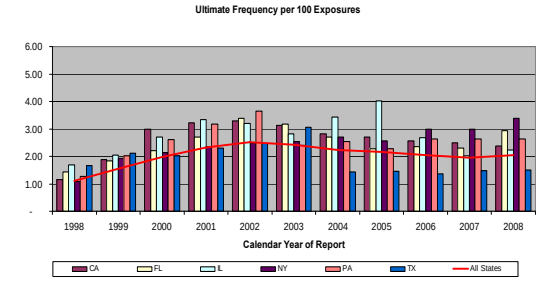


Size of Zurich's Submission Database

(this is an industry-wide information and does not necessarily reflect Zurich's own experience)

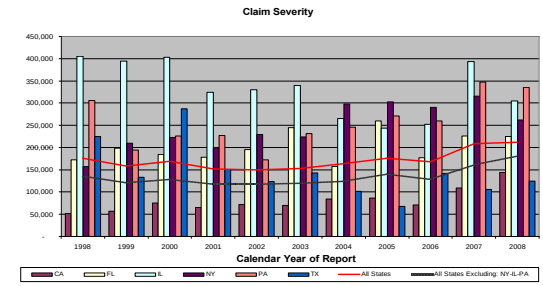


Frequency per 100 OBEs



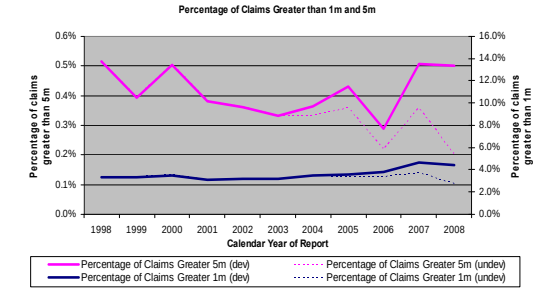
Overall Frequency Trends		
1998-2008	1998-2002	2002-2008
3.6%	23.0%	-4.0%

Ultimate Claim Severity

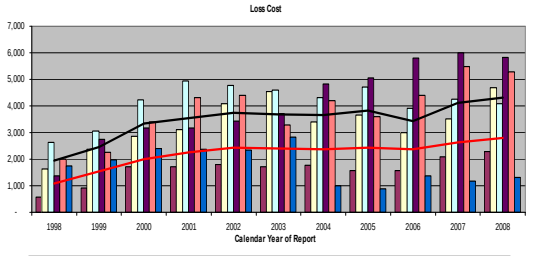


Overall Severity Trends			Trends: All States x NY, IL & PA		
1998-2008	1998-2002	2002-2008	1998-2008	1998-2002	2002-2008
2.2%	-3.7%	6.3%	2.7%	-3.2%	7.1%

Percentage of Claims Greater than 1m & 5m

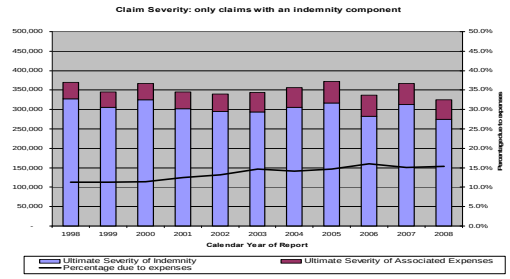


Loss Cost per OBE
Developed Claims limited to 1m each

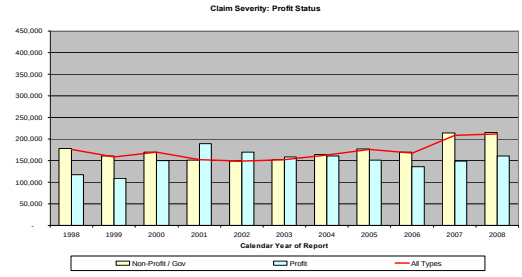


Overall Loss Cost Trends (Lim 1m)			Overall Loss Cost Trends (Unlimited)		
1998-2008	1998-2002	2002-2008	1998-2008	1998-2002	2002-2008
7.2%	22.3%	2.3%	5.9%	18.5%	2.0%

Ultimate Claim Severity
Claims with an indemnity component & their associated expenses

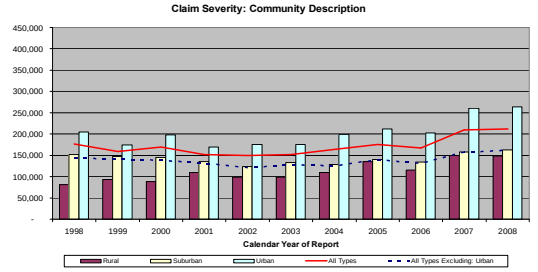


Ultimate Claim Severity
Profit Status



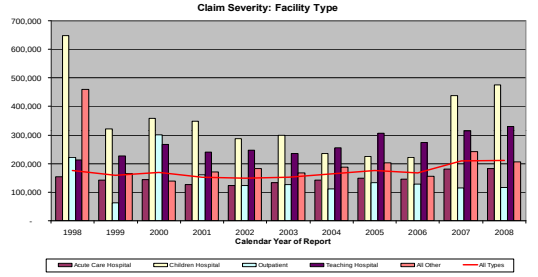
Overall Severity Trends		
1998-2008	1998-2002	2002-2008
2.2%	-3.7%	6.3%

Ultimate Claim Severity
Community Type



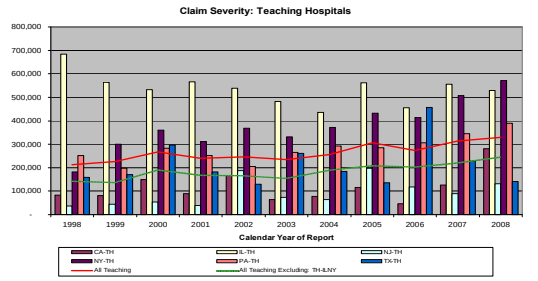
Overall Severity Trends		
1998-2008	1998-2002	2002-2008
2.2%	-3.7%	6.3%

Ultimate Claim Severity
Facility Type



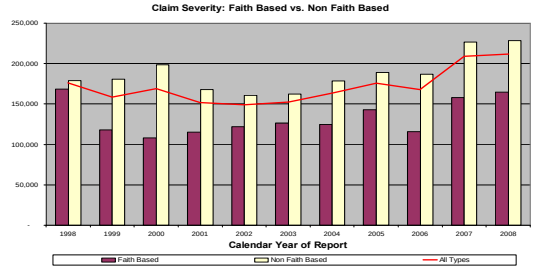
Overall Severity Trends		
1998-2008	1998-2002	2002-2008
2.2%	-3.7%	6.3%

Ultimate Claim Severity
Teaching Hospitals



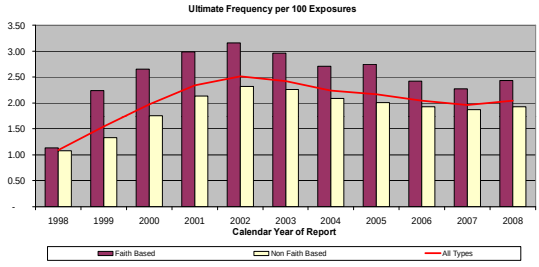
Overall Severity Trends: Teaching Hospitals			Trends: All Teaching x IL & NY		
1998-2008	1998-2002	2002-2008	1998-2008	1998-2002	2002-2008
3.8%	3.7%	5.6%	5.0%	5.2%	7.2%

Ultimate Claim Severity
Faith Based Hospitals vs. Non Faith Based



Overall Severity Trends		
1998-2008	1998-2002	2002-2008
2.2%	-3.7%	6.3%

Frequency per 100 OBEs
Faith Based Hospitals vs. Non Faith Based



Overall Frequency Trends		
1998-2008	1998-2002	2002-2008
3.6%	23.0%	-4.0%

Countrywide Trend

The following slides show loss costs, severities and frequencies by year. Loss costs and severities are capped at different limits and also shown by layer.

The trend patterns are clear

- **Distinct period of high trend during the late 90s and early 2000s.**
- **Lower trend thereafter.**
- **Trends vary by layer: the larger the claim, the lower the trend.**

However, trends may also vary by

-State
-Hospital Characteristics
-Other Factors

Not part of our study

Analysis of Loss Cost Trends
Periods of high trends and low trends

CY of Report	Ultimate Loss Costs Limited to 1m	5m	10m	15m	Unlimited
1998	1,073	1,607	1,769	1,828	1,930
1999	1,537	2,215	2,387	2,437	2,462
2000	1,991	2,981	3,217	3,297	3,332
2001	2,246	3,287	3,499	3,546	3,548
2002	2,425	3,501	3,701	3,741	3,752
2003	2,387	3,414	3,640	3,689	3,696
2004	2,364	3,367	3,563	3,617	3,648
2005	2,439	3,537	3,758	3,805	3,819
2006	2,371	3,287	3,397	3,411	3,421
2007	2,621	3,813	4,039	4,084	4,102
2008	2,811	4,016	4,253	4,294	4,310
Total	**2,246**	**3,239**	**3,439**	**3,486**	**3,509**

Trends

98-08	7.2%	6.7%	6.3%	6.1%	**5.9%**
98-02	22.3%	21.5%	20.4%	19.8%	18.5%
02-08	2.3%	2.2%	2.1%	2.0%	2.0%

Analysis of Loss Cost Trends
Trends by layer

CY of Report	Ultimate Loss Costs in the Layer 1m	4m x 1m	5m x 5m	5m x 10m
1998	1,073	534	162	58
1999	1,537	678	172	50
2000	1,991	989	236	80
2001	2,246	1,041	212	47
2002	2,425	1,075	200	41
2003	2,387	1,027	225	50
2004	2,364	1,003	197	54
2005	2,439	1,098	221	47
2006	2,371	916	109	14
2007	2,621	1,192	226	45
2008	2,811	1,205	236	41
Total	**2,246**	**993**	**200**	**47**

Trends

98-08	7.2%	5.7%	0.7%	-6.2%
98-02	22.3%	20.1%	6.5%	-7.6%
02-08	2.3%	2.0%	-0.3%	-5.1%

Analysis of Frequency and Severity Trends
Periods of high trends and low trends

CY of Report	Ult Freq	Ultimate Severity Limited to 1m	5m	10m	15m	Unlimited
1998	1.10	97,944	146,699	161,497	166,828	176,125
1999	1.55	99,083	142,797	153,853	157,098	158,680
2000	1.97	101,113	151,339	163,335	167,388	169,203
2001	2.34	96,175	140,727	149,796	151,828	151,899
2002	2.51	96,511	139,308	147,275	148,887	149,312
2003	2.43	98,401	140,745	150,034	152,094	152,381
2004	2.23	105,867	150,779	159,584	162,002	163,395
2005	2.17	112,315	162,906	173,087	175,239	175,909
2006	2.04	116,247	161,142	166,503	167,191	167,700
2007	1.96	133,601	194,380	205,887	208,203	209,114
2008	2.04	137,948	197,083	208,678	210,713	211,506
Total	**2.05**	**109,582**	**158,026**	**167,806**	**170,115**	**171,240**

Trends

98-08	3.6%	3.4%	3.0%	2.6%	2.4%	2.2%
98-02	23.0%	-0.6%	-1.2%	-2.1%	-2.6%	-3.7%
02-08	-4.0%	6.6%	6.5%	6.3%	6.3%	6.3%

Analysis of Frequency and Severity Trends
Trends by layer

CY of Report	Ult Freq	Ultimate Severity in the Layer 1m	4m x 1m	5m x 5m	5m x 10m
1998	1.10	97,944	48,755	14,799	5,330
1999	1.55	99,083	43,714	11,056	3,245
2000	1.97	101,113	50,225	11,997	4,052
2001	2.34	96,175	44,551	9,069	2,033
2002	2.51	96,511	42,798	7,967	1,612
2003	2.43	98,401	42,344	9,289	2,059
2004	2.23	105,867	44,912	8,805	2,418
2005	2.17	112,315	50,591	10,180	2,153
2006	2.04	116,247	44,895	5,361	687
2007	1.96	133,601	60,779	11,507	2,316
2008	2.04	137,948	59,135	11,595	2,035
Total	**2.05**	**109,582**	**48,444**	**9,781**	**2,309**

Trends

98-08	3.6%	3.4%	2.1%	-2.8%	-9.5%
98-02	23.0%	-0.6%	-2.4%	-13.4%	-24.9%
02-08	-4.0%	6.6%	6.2%	3.9%	-1.2%

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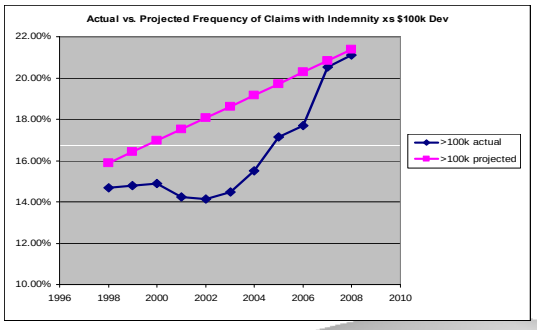
Actual vs. Projected Frequencies
$100k – in line with expectations



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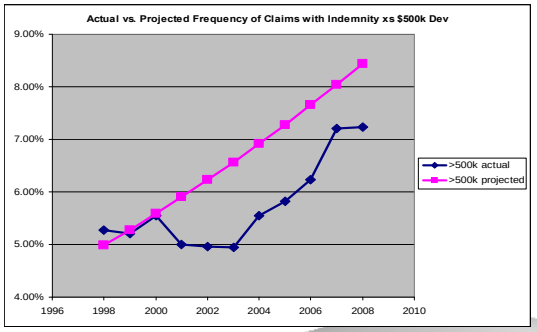
Actual vs. Projected Frequencies
$500k – in line with expectations



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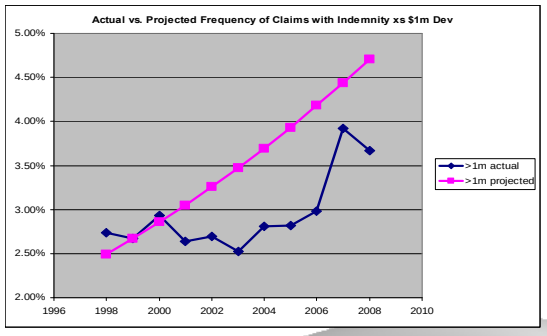
Actual vs. Projected Frequencies
$1m – somewhat in line with expectations



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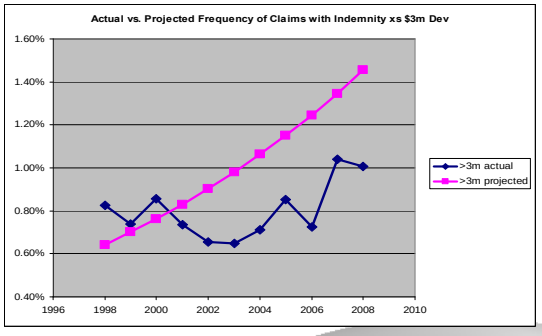
Actual vs. Projected Frequencies
$3m – divergence from expectation



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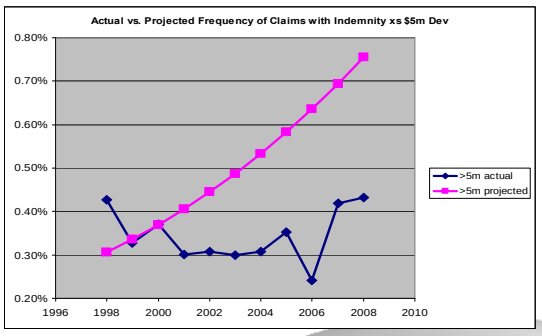
Actual vs. Projected Frequencies
$5m – divergence from expectation



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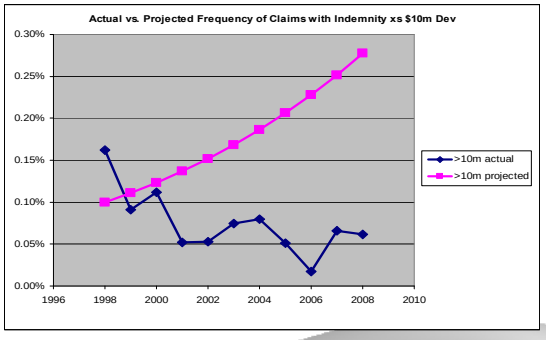
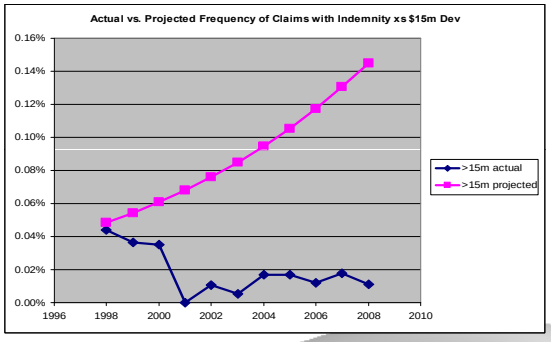
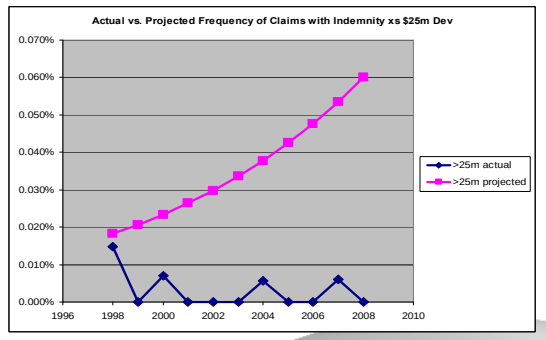
Actual vs. Projected Frequencies
$10m – divergence from expectation



Actual vs. Projected Frequencies
$15m – divergence from expectation



Actual vs. Projected Frequencies
$25m – divergence from expectation



Observations and Possible Conclusions

1. **Trend is significantly higher for lower layers.**
2. **Expected increase in large claims was not observed.**
3. **Trend in Excess layer was actually less than in Primary layer**

Trend is not uniform for losses of all sizes

Traditional trend assumption is that trend is independent of size:

$$X \rightarrow a\,X$$

For All Xs

We have strong evidence to suggest that Trend IS size-dependent.
The 'transformation' function is not linear, but a function of size of loss.

$$X \rightarrow f(X)\,X$$

What is a 'large' sum of money?
Perception…

- Evidence suggests that these 'large' losses are not subject to the same inflationary pressures as 'small' losses.
  - Large losses are likely to be impacted by the **perception** of what 'a large sum of money' is.
  - Social Economics appears to play a big role.
    1. Late 90s early 2000s: internet bubble changed the perception of '$1m' – people became millionaires overnight – **the social definition of a 'large sum of money' changed drastically** (period of high trends)
    2. Early 2000s to present (after internet bubble burst) – **the social definition of a 'large sum of money' has not changed materially** (period of low to moderate trends).
    3. In my opinion, we were ready for another 'jump' in 2008-2009, but 'Great Recession' has reset our expectations
    4. For extremely large sums of money (ie $10m+) – **the social definition of '$10m' has not changed materially** (it **was** 'a lot' of money in 2001 and **is** 'a lot' of money in 2011.

Simplified Example
Hypothetical Example: will not work for all X

Assume X has a transformation as follows

$$X \rightarrow a\,X^{b}$$

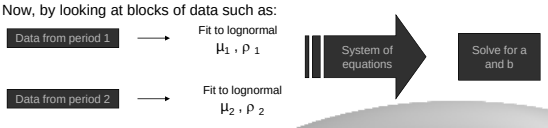
Then, assuming a lognormal distribution and using 1st and 2nd moments we can solve for μ_2 and ρ_2 in terms of μ_1 and ρ_1

Recursive relationship:

$$\mu_2 = \ln(a) + b\,\mu_1$$

$$\rho_2 = b\,\rho_1$$

Now, by looking at blocks of data such as:



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