

# 2004 Enterprise Risk Management Symposium

## *Risk Management Through Securitization - Trends and Issues*

**Renaissance Chicago Hotel  
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# OUTLINE

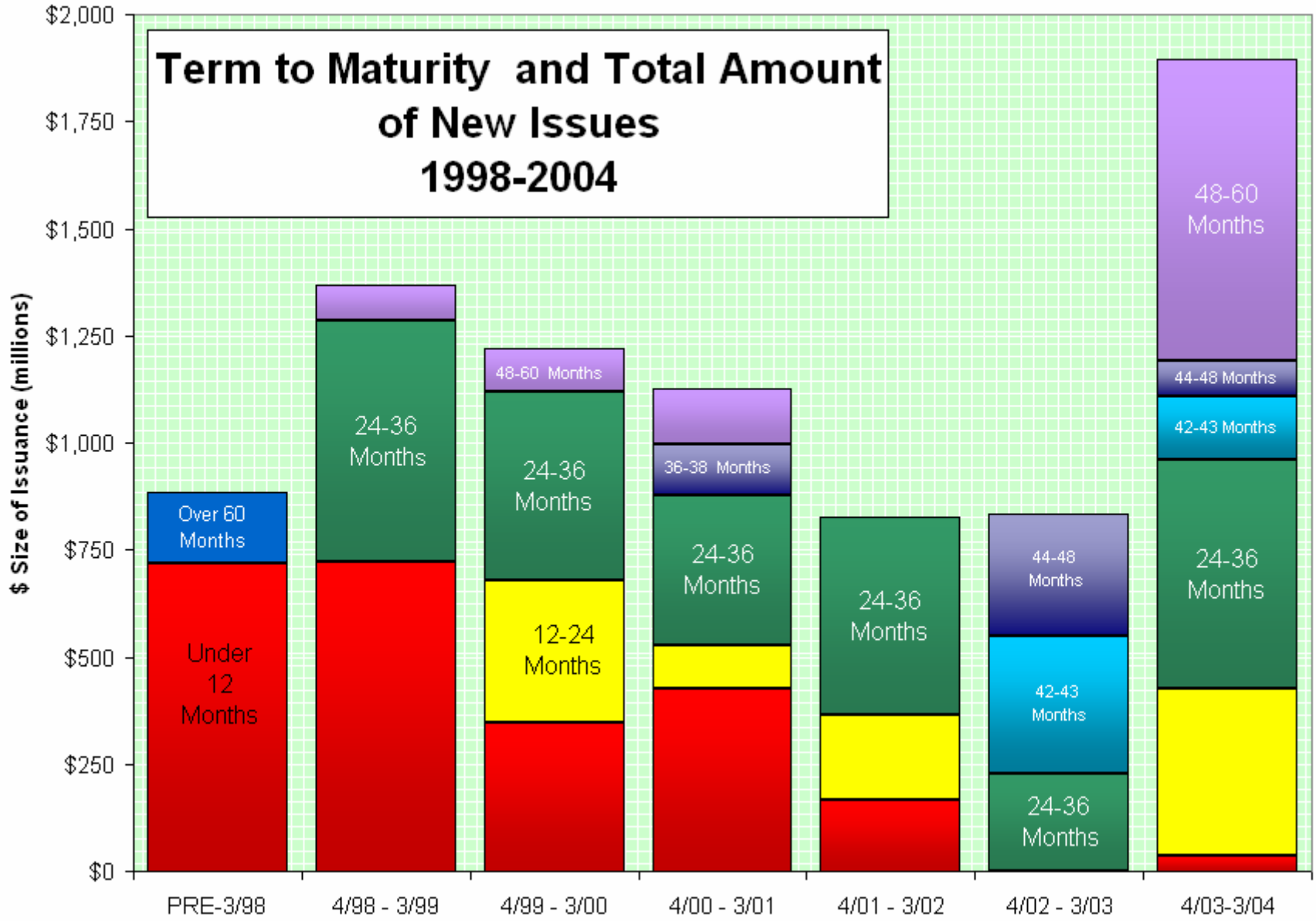
- Securitization Trends 2003 -2004
- Issuer Perspective - Specific Activity by  
USAA  
Swiss Re
- Investor Perspective - Portfolio Construction
- Pricing Theory and Empirical Observations
- The Search for Arbitrage-Free Models

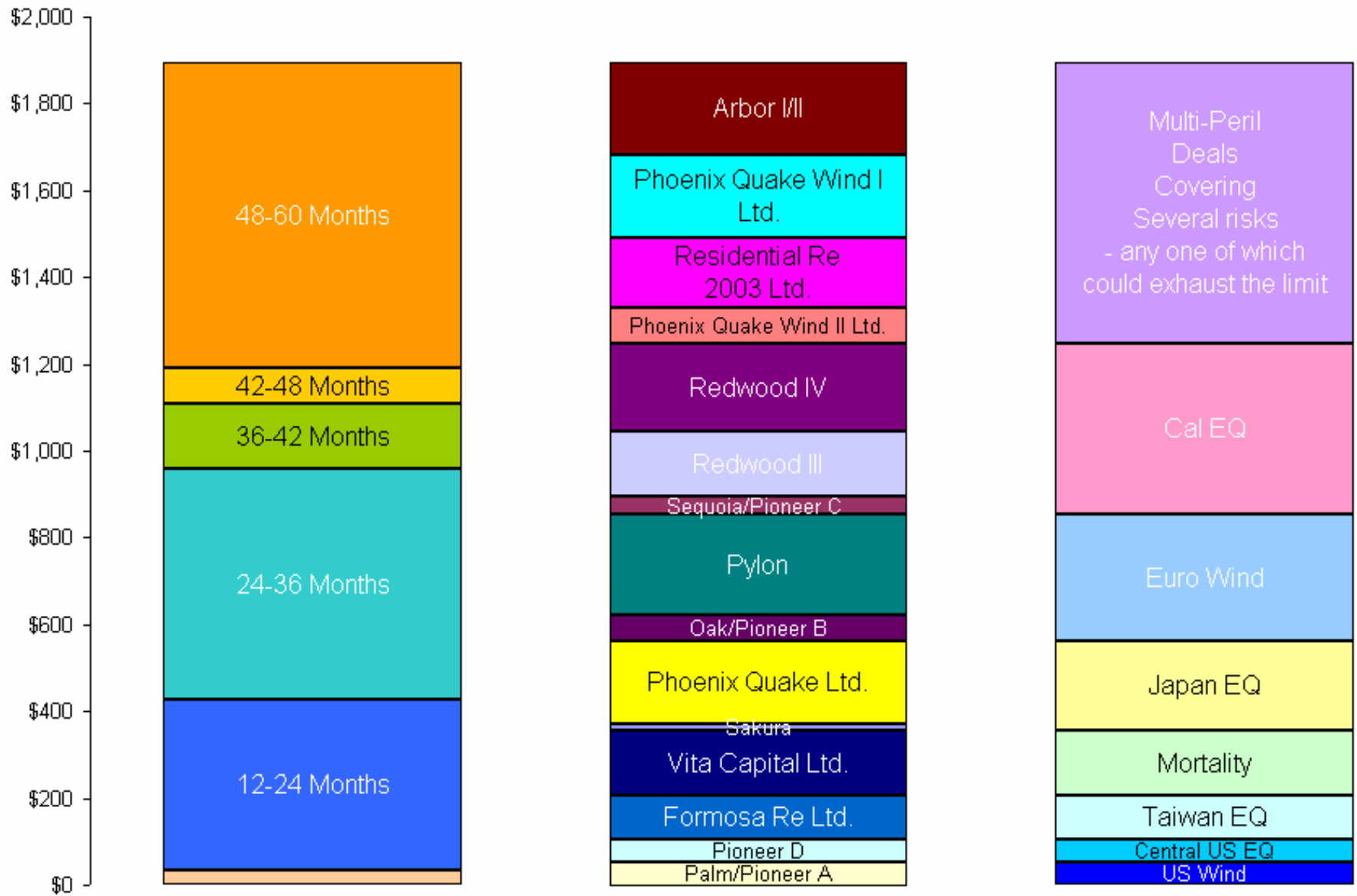
The  
Q2 2003 –  
Q1 2004  
Securitizations

ARBOR I LTD.  
ARBOR II LTD.  
FORMOSA RE LTD.  
OAK CAPITAL LTD.  
PALM CAPITAL LTD.  
PHOENIX QUAKE LTD.  
PHOENIX QUAKE WIND LTD.  
PHOENIX QUAKE WIND II LTD.  
PIONEER 2000 LTD.  
(4 Classes with 5 Issues)  
PYLON LTD.  
REDWOOD III LTD.  
REDWOOD IV LTD.  
RESIDENTIAL RE 2003  
SAKURA LTD.  
SEQUOIA CAPITAL LTD.  
VITA CAPITAL LTD.

GOLDEN GOAL FINANCE  
BARCLAY'S LIFE ASSURANCE  
LILACS (Life insurance and  
Life Annuities-backed  
Charitable Securities)

# Term to Maturity and Total Amount of New Issues 1998-2004



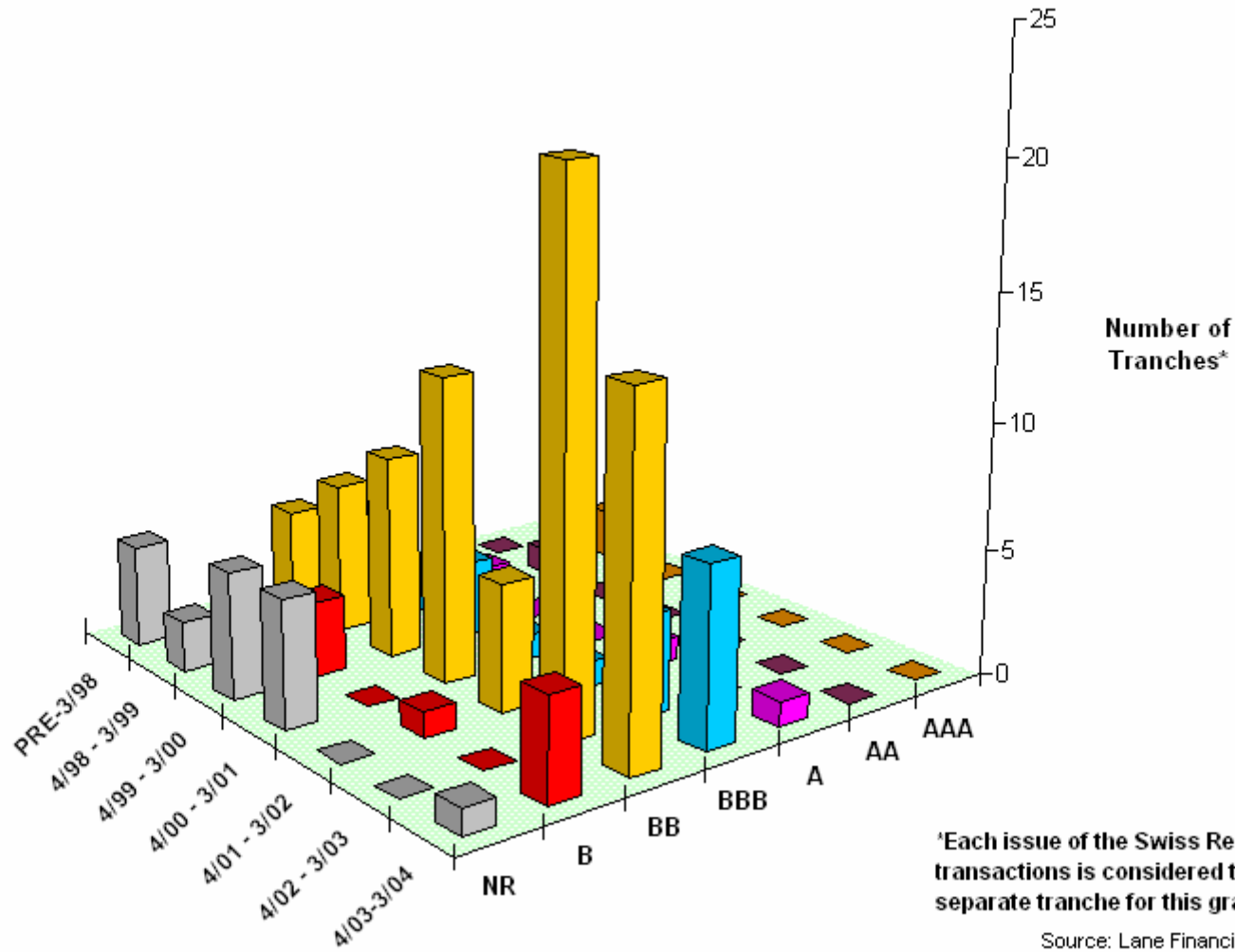


**Term**

**Amount**

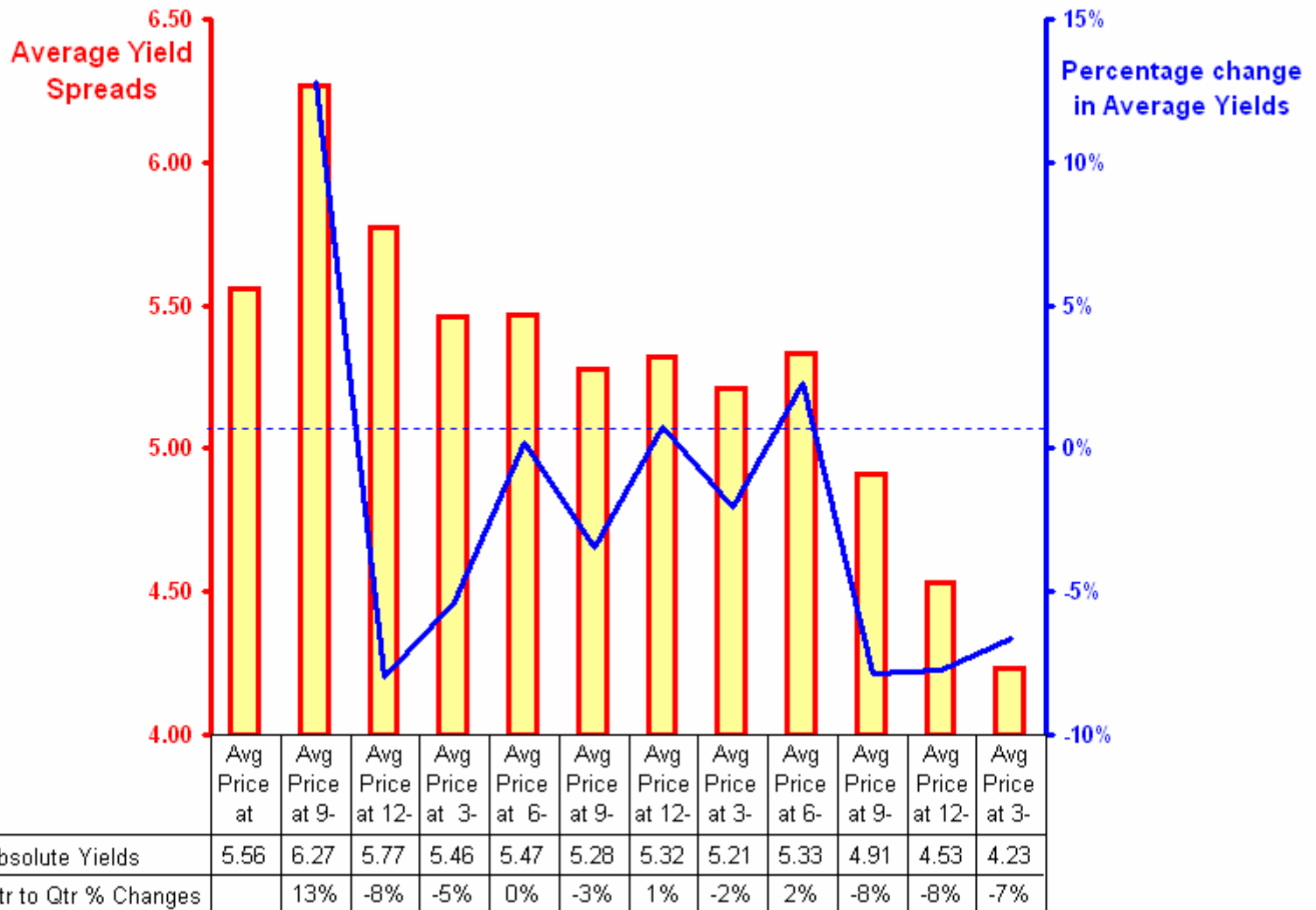
**Zone**

# RATINGS CHANGES OVER TIME (by Number of Rated Tranches)



# Changes in Average Secondary Market Cat Bond Spreads

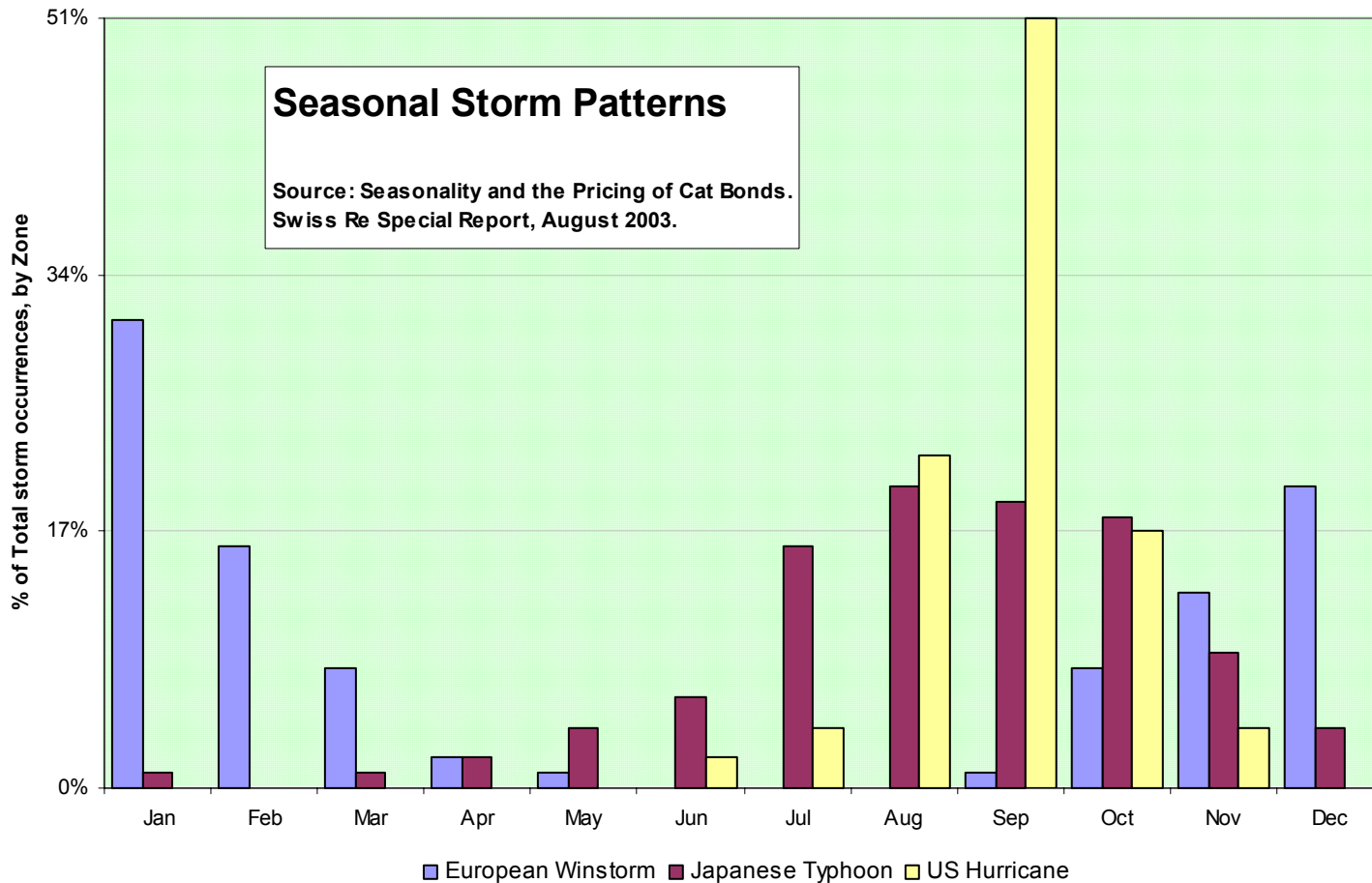
Qtr to Qtr 2001-2003



## Secondary Prices

- Showing effect of Maturity, Exposure, and Market

	Issue Price	Maturity	Q 2 2003	Q 3 2003	Q 4 2003	Q1 2004	
Res Re 2001 Ltd.	4.99	Q 2 2004	4.73	3.54	1.48	1.45	Wind Only
Res Re 2002 Ltd.	4.90	Q 2 2005	4.67	3.98	4.90	3.50	Fla + Hi
Res Re 2003 Ltd.	4.95	Q 2 2006	4.87	4.26	4.95	4.05	Multi-Peril



Issuer Perspective - Specific Activity by

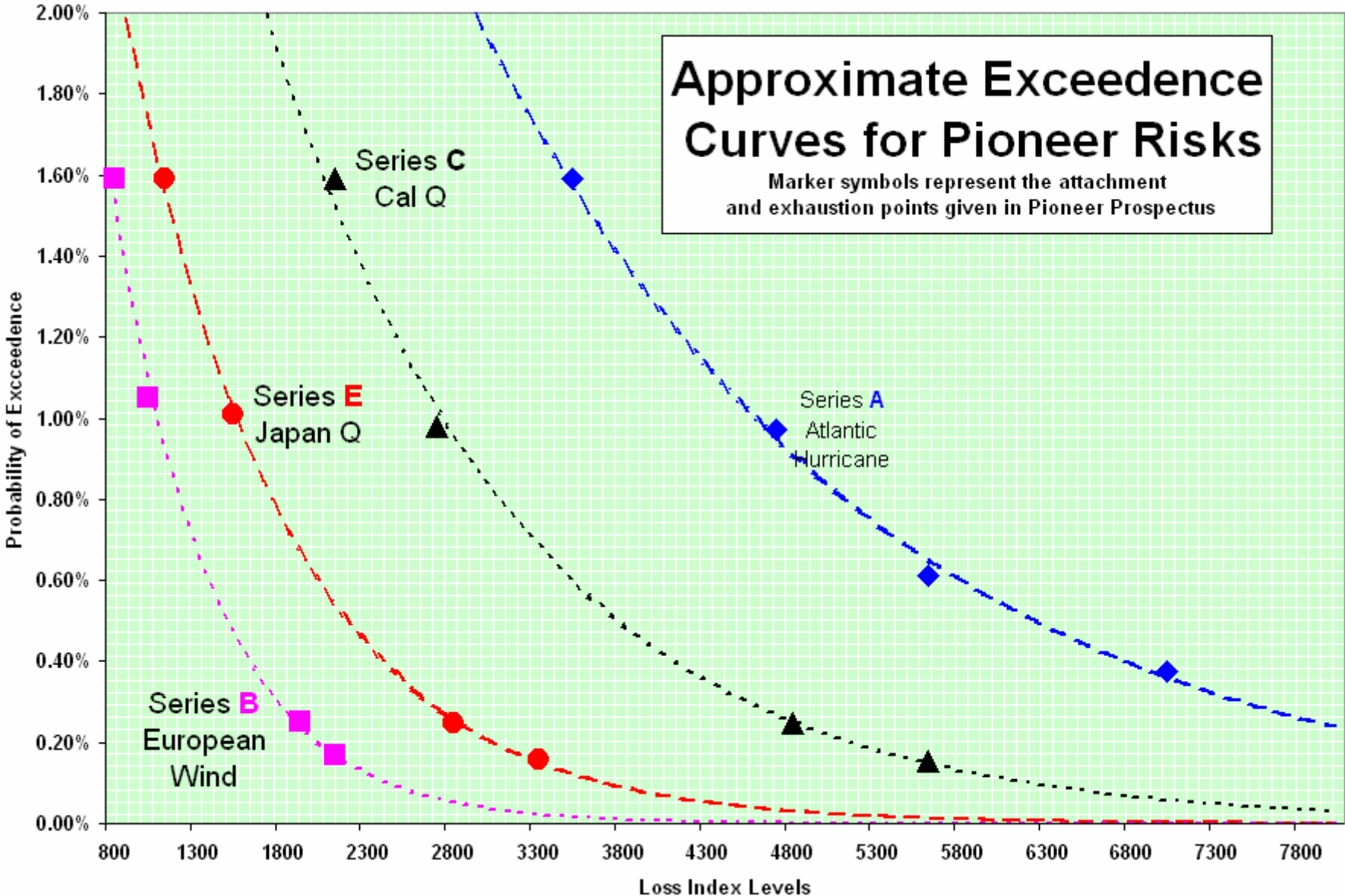
Swiss Re  
USAA

# Swiss Re

- Lead Issuer of Third party securities 2003-2004
- Lead Issuer of securities for *own* protection
- Issued Pioneer Series starting in 2002 – for 5 single peril series (A thru D) plus a single multi-peril series F. Fixed Maturity.
- Issued “Arboreal” series Palm, Oak, Sequoia, Sakura Plus Two layers of Multi-peril bonds, Arbor I and II, representing first and “third” layer of total portfolio.
- In Arboreal series investor choose maturity.  
(Up to 4 years)

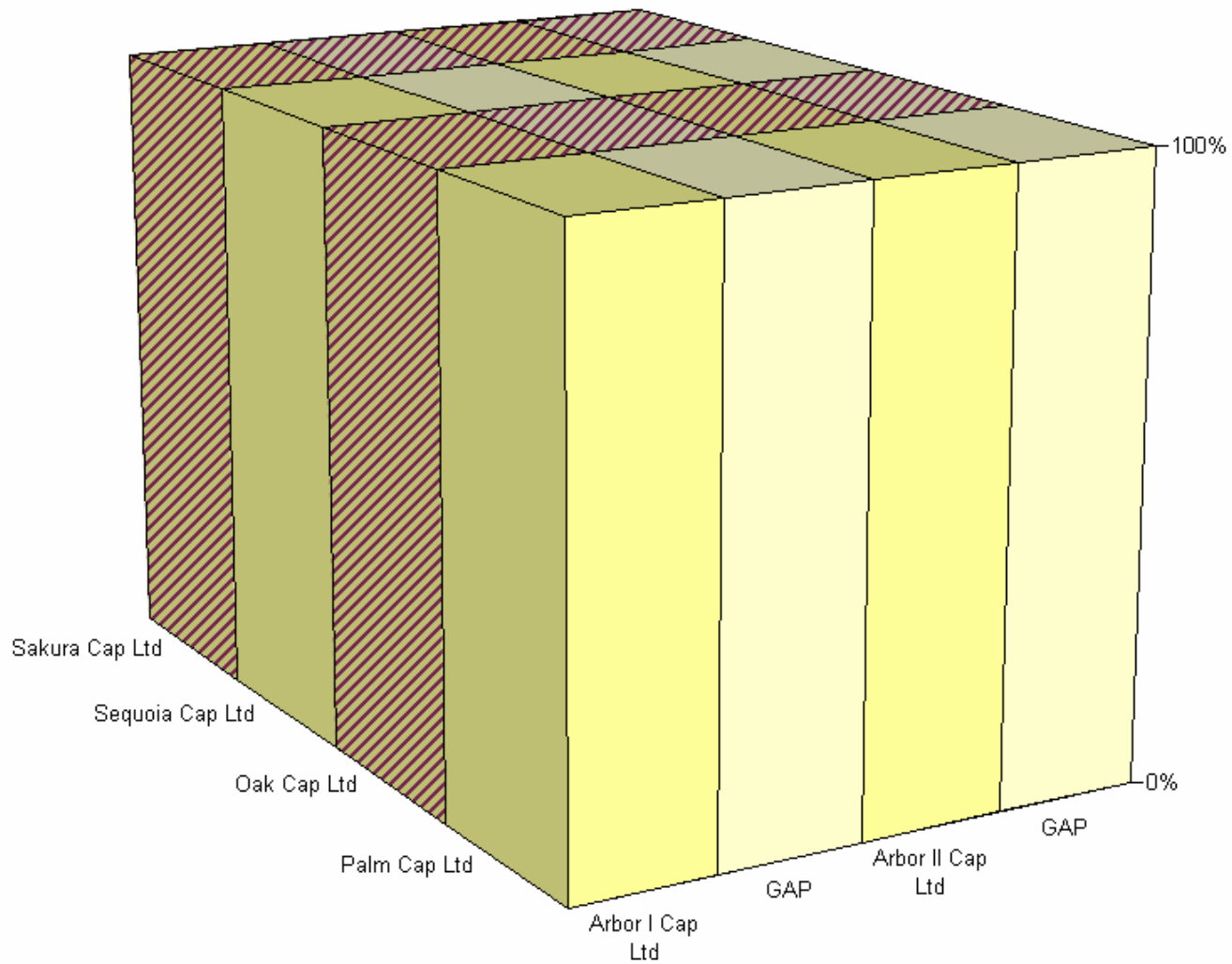
# Approximate Exceedence Curves for Pioneer Risks

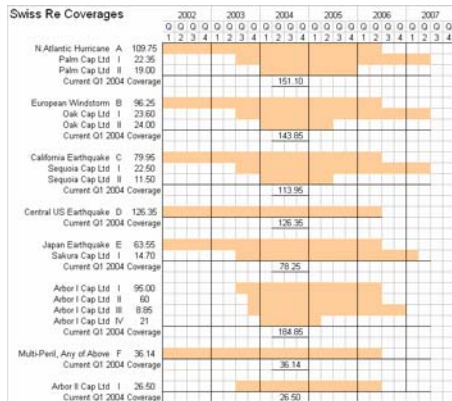
Marker symbols represent the attachment and exhaustion points given in Pioneer Prospectus



# Swiss Re Coverages

			2002				2003				2004				2005				2006				2007			
			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N.Atlantic Hurricane A	109.75																									
Palm Cap Ltd I	22.35																									
Palm Cap Ltd II	19.00																									
Current Q1 2004 Coverage										151.10																
European Windstorm B	96.25																									
Oak Cap Ltd I	23.60																									
Oak Cap Ltd II	24.00																									
Current Q1 2004 Coverage										143.85																
California Earthquake C	79.95																									
Sequoia Cap Ltd I	22.50																									
Sequoia Cap Ltd II	11.50																									
Current Q1 2004 Coverage										113.95																
Central US Earthquake D	126.35																									
Current Q1 2004 Coverage										126.35																
Japan Earthquake E	63.55																									
Sakura Cap Ltd I	14.70																									
Current Q1 2004 Coverage										78.25																
Arbor I Cap Ltd I	95.00																									
Arbor I Cap Ltd II	60																									
Arbor I Cap Ltd III	8.85																									
Arbor I Cap Ltd IV	21																									
Current Q1 2004 Coverage										184.85																
Multi-Peril, Any of Above F	36.14																									
Current Q1 2004 Coverage										36.14																
Arbor II Cap Ltd I	26.50																									
Current Q1 2004 Coverage										26.50																





## TOTALS COVERAGE BY ZONE Q1 2004

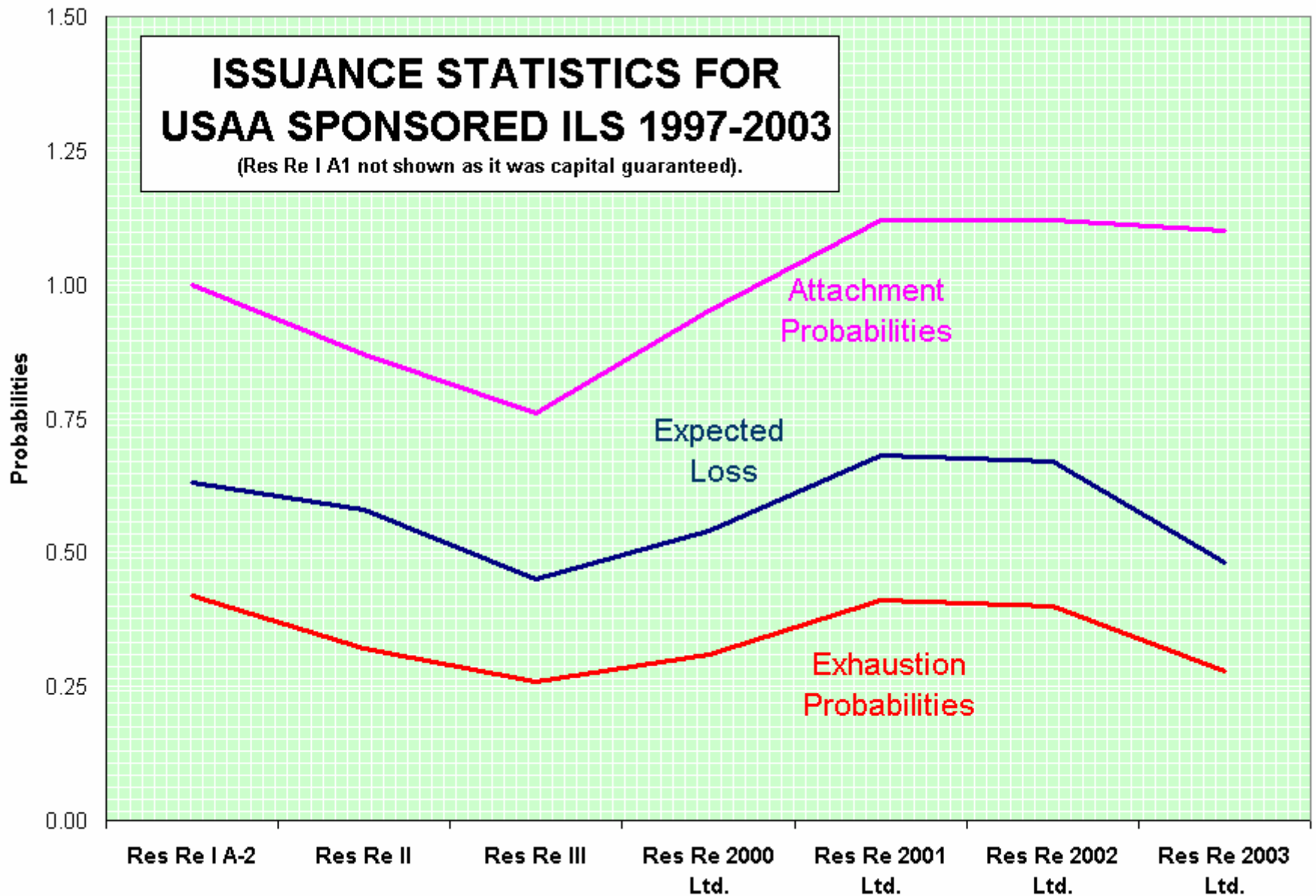
N. Atlantic Hurricane	\$398.59 million
European Windstorm	\$391.34 million
California Earthquake	\$361.44 million
Central US Earthquake	\$162.49 million
Japan Earthquake	\$325.74 million
Multi-Peril, Any sum of Above	\$247.49 million

USAA

USAA - RESIDENTIAL RE	1997/8	1998/9	1999/00	2000/01	"2001/02/03"	"2002/03/04"
AMOUNT	\$477 mm*	\$500 mm	\$200 mm	\$200 mm	\$150 mm	\$125 mm
RETENTION	20%	10%	10%	10%	10%	10%
REINSURANCE	0	0	50%	50%	60%	69%
SECURITIZATION	80%	90%	40%	40%	30%	21%
TERM	12 months	12 months	12 months	12 months	36 months	36 months
COUPON or PREMIUM	A1:L1+250 A2:L1+576	L3 + 416	L3 + 366	L3 + 410	L3 + 499	L3+490
EXP LOSS	-na-	-na-	.44%	.54%	.68%	0.67%
PFL	1.00%	.87%	.87%	.76%	1.12%	1.12%

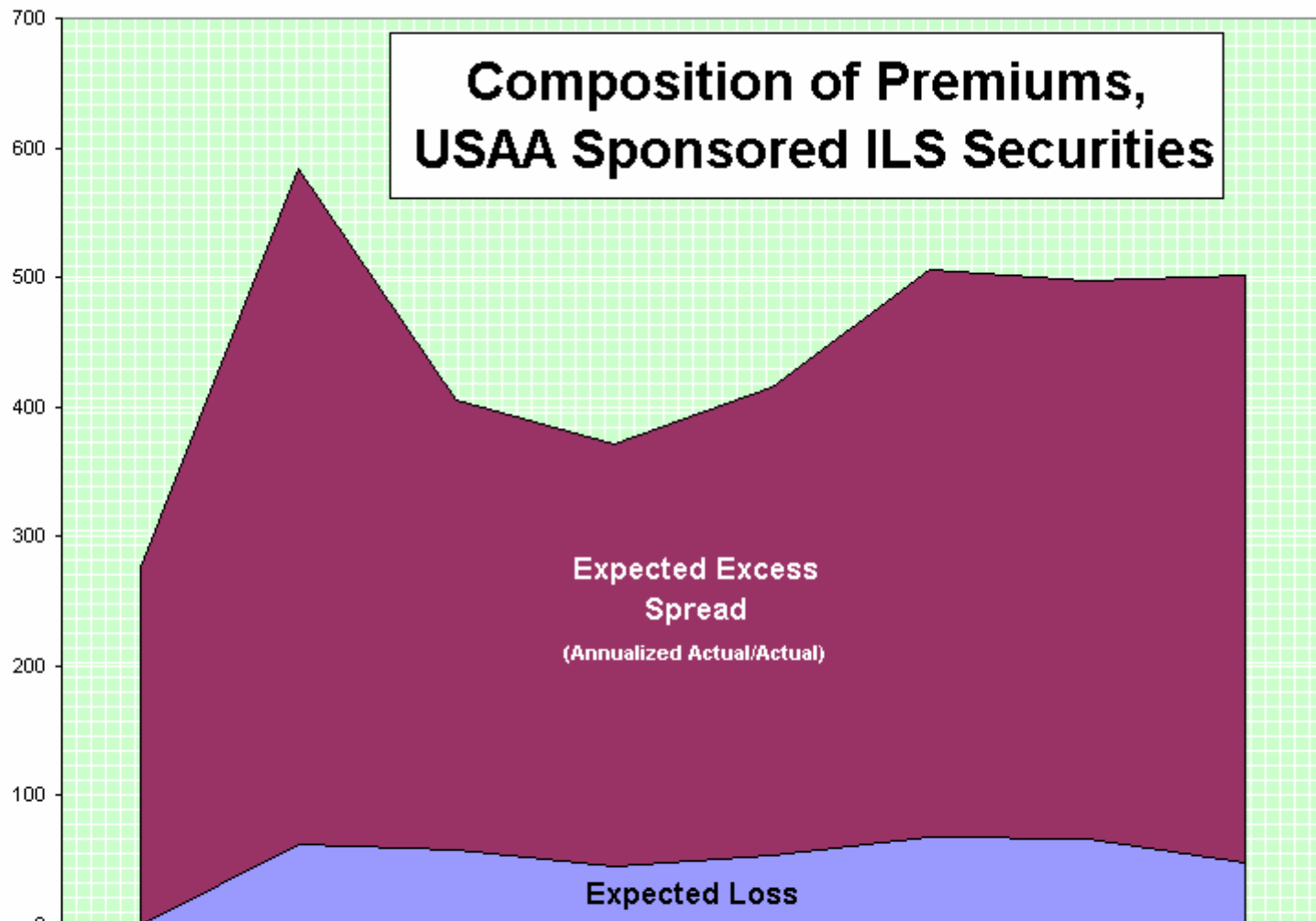
# ISSUANCE STATISTICS FOR USAA SPONSORED ILS 1997-2003

(Res Re I A1 not shown as it was capital guaranteed).



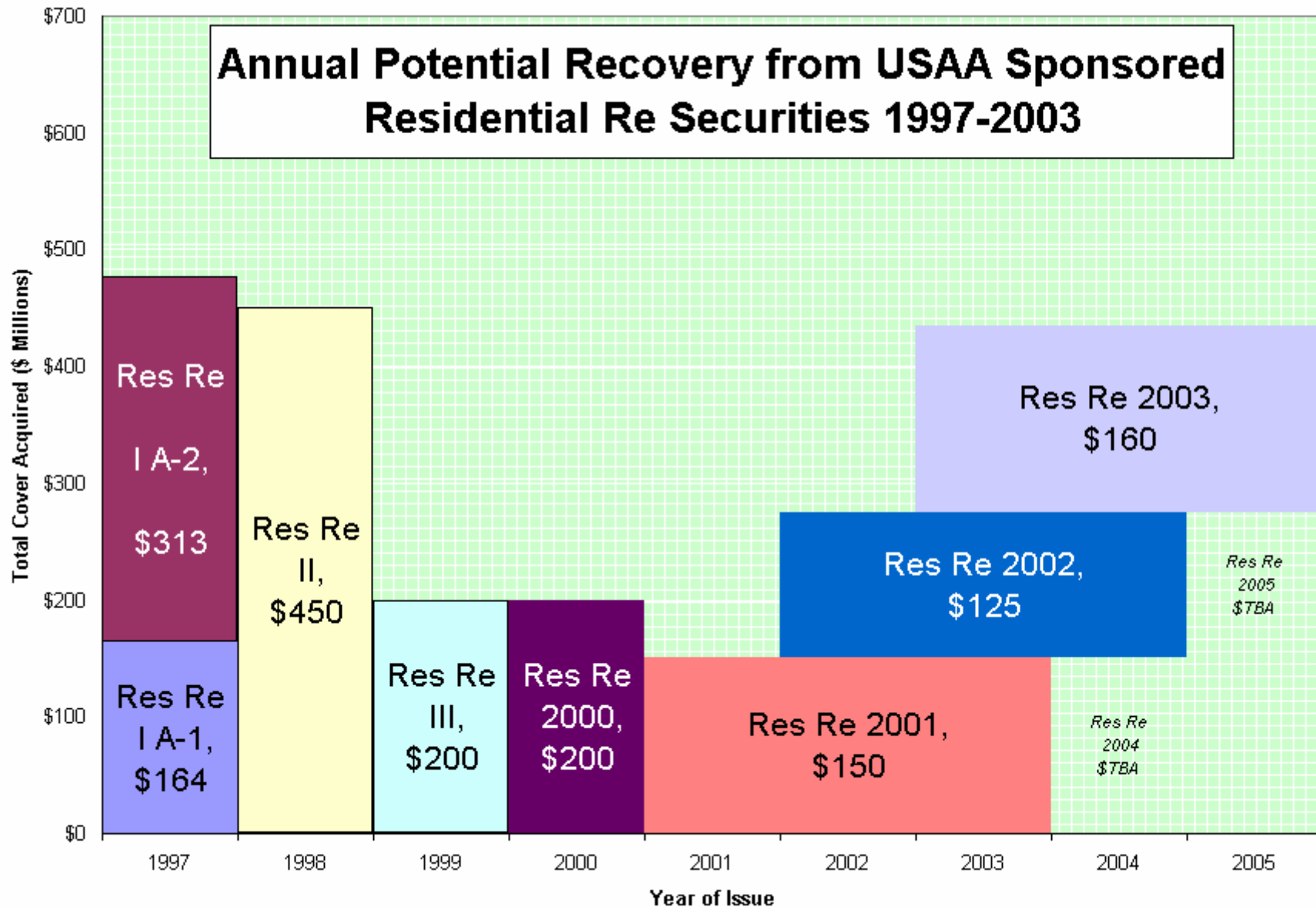
Basis Points

# Composition of Premiums, USAA Sponsored ILS Securities

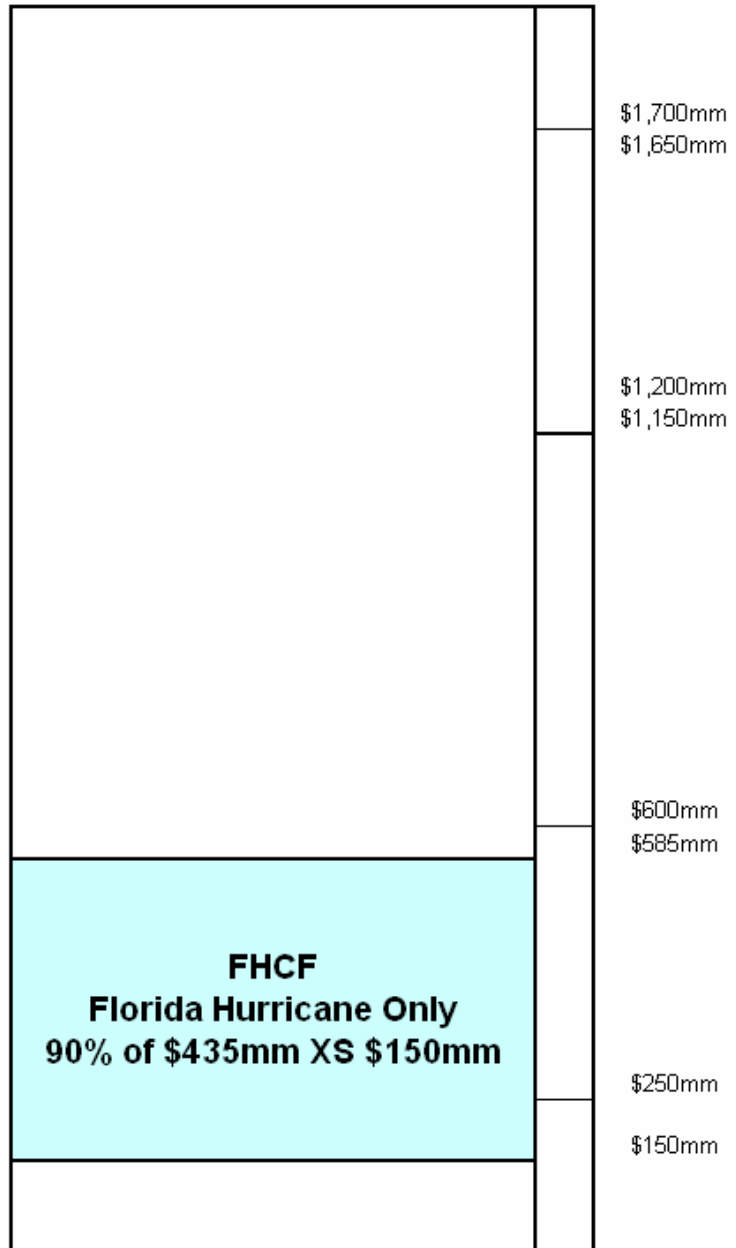


	Res Re I A-1	Res Re I A-2	Res Re II	Res Re III	Res Re 2000 Ltd.	Res Re 2001 Ltd.	Res Re 2002 Ltd.	Res Re 2003 Ltd.
Premium as a Multiple of EL	0	9.3	7.0	8.2	7.7	7.4	7.4	10.5
Expected Excess Spread (A/A)	277	521	348	326	362	438	430	454
Expected Loss	0	63	58	45	54	68	67	48

# Annual Potential Recovery from USAA Sponsored Residential Re Securities 1997-2003



# FHCF



# Hurricane

			\$1,700mm
			\$1,650mm
<b>Traditional Reinsurance 3rd Layer</b> Hurricane, EQ 35% \$550 XS \$\$1150mm	<b>Res Re 2001 (Cat. 3,4,5 Hurricane in 21 Gulf Coast States) (30%)</b>	<b>Res Re 2002 (Cat. 3,4,5 Hurricane in 21 Gulf Coast States + Hawaii) (25%)</b>	\$1,200mm \$1,150mm
<b>Traditional Reinsurance 2nd Layer with 1 Reinstatement Hurricane, EQ</b> 90% of \$550mm XS \$600mm			\$600mm \$585mm
<b>Traditional Reinsurance 1st Layer with 1 Reinstatement Hurricane, EQ (Ex FL)</b> 70% of \$350mm XS \$250mm			\$250mm
			\$150mm

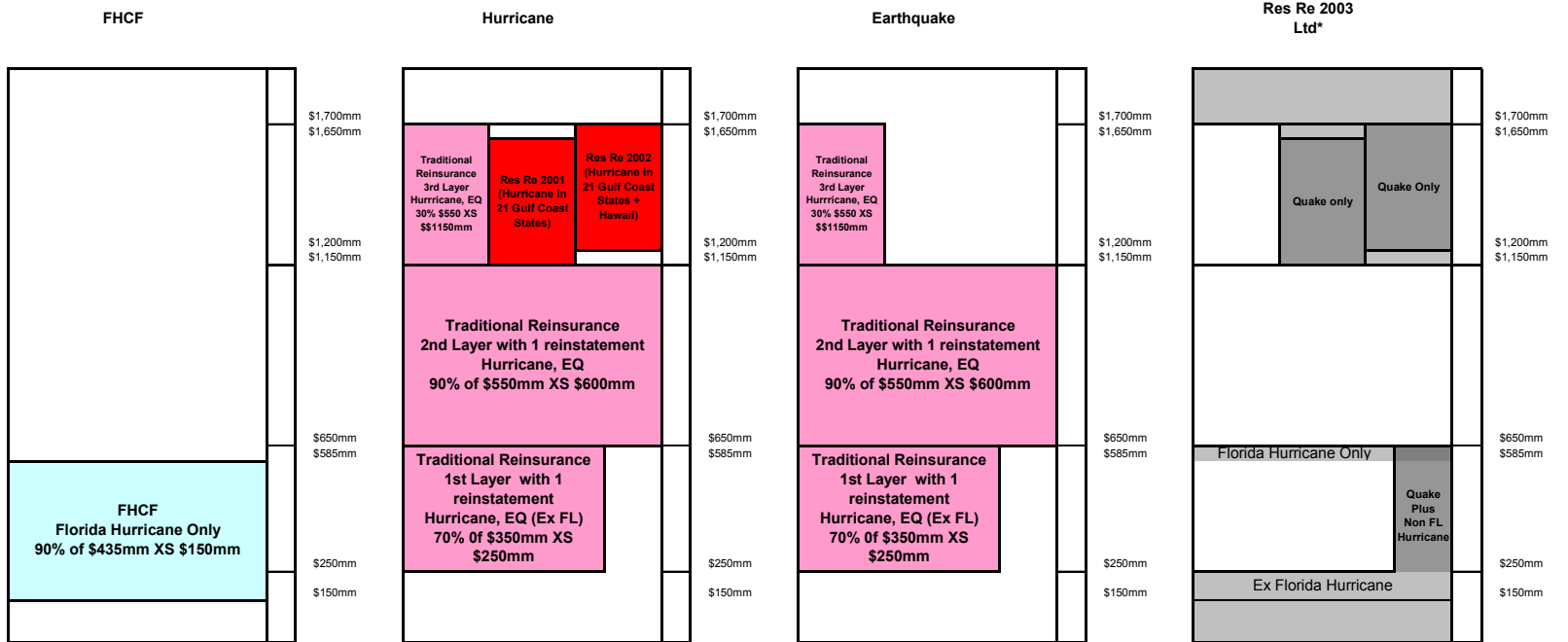
# Earthquake

		\$1,700mm
		\$1,650mm
<b>Traditional Reinsurance 3rd Layer Hurricane, EQ 35% \$550 XS \$\$1150mm</b>		\$1,200mm
		\$1,150mm
<b>Traditional Reinsurance 2nd Layer with 1 Reinstatement Hurricane, EQ 90% of \$550mm XS \$600mm</b>		\$600mm
		\$585mm
<b>Traditional Reinsurance 1st Layer with 1 Reinstatement Hurricane, EQ (Ex FL) 70% Of \$350mm XS \$250mm</b>		\$250mm
		\$150mm

**Res Re 2003  
Ltd\***

		\$1,700mm
		\$1,650mm
	Quake only	
	Quake Only	
		\$1,200mm
		\$1,150mm
Florida Hurricane Only		
		\$600mm
		\$585mm
	Quake Plus Non FL Hurricane	
		\$250mm
Ex Quake and Florida Hurricane		
		\$150mm

## Recovery Potential From the Florida Hurricane Catastrophe Fund, Traditional Reinsurance, Existing Securitizations and Res Re 2003 Ltd



\* Losses in the shaded area is eligible for Res Re 2003 Ltd Cause of Loss could be Hurricane or Earthquake, except as noted.

# Pricing Models Theory and Empirical Observations

# THREE USEFUL PRICING MODELS

## Kreps Model (K)

$$\text{Price} = \text{EL} + \gamma * [\text{Std Dev}]$$

## Kreps and Major (K&M)

$$\text{Price} = \gamma * [\text{EL}]^{\alpha}$$

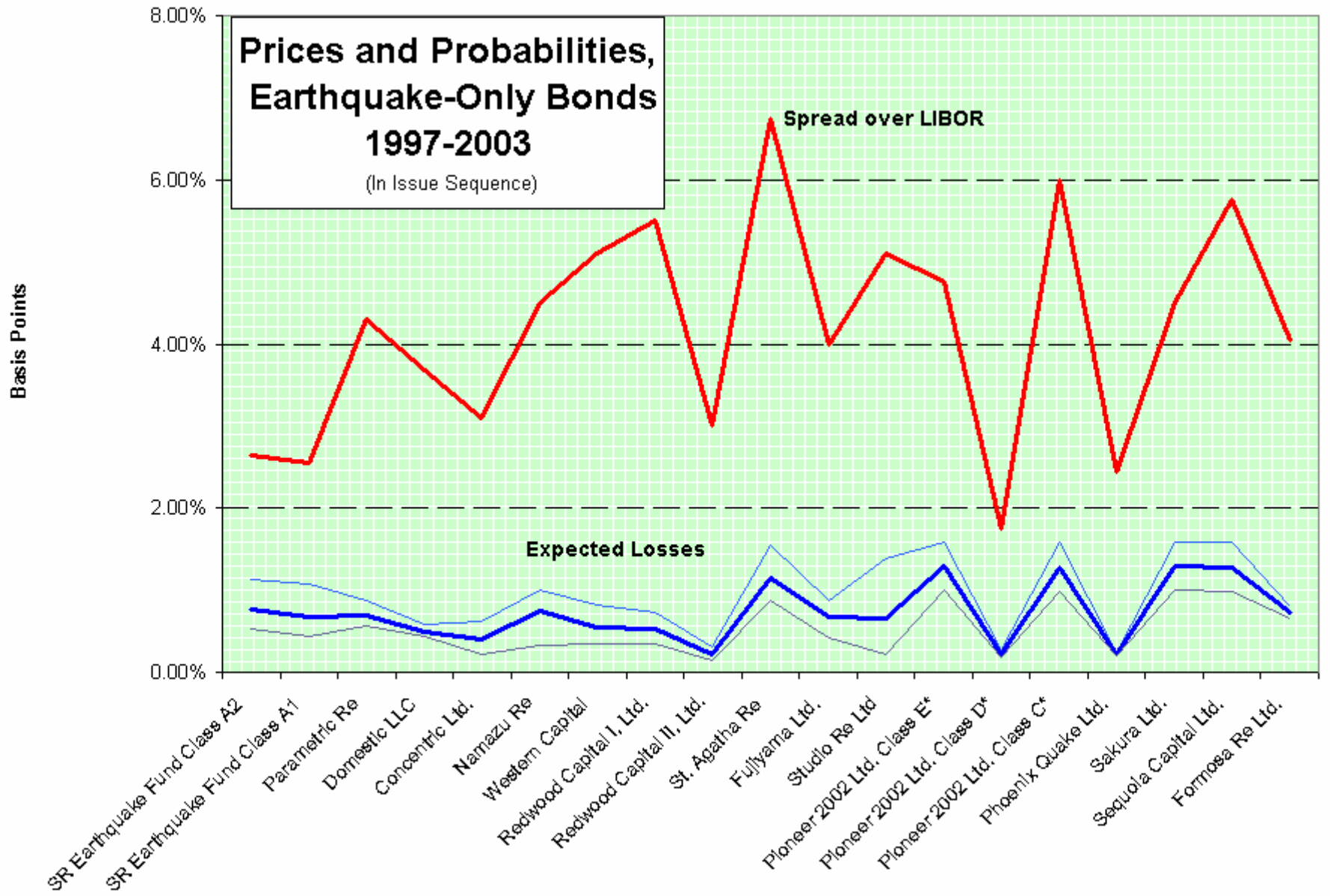
## LFC

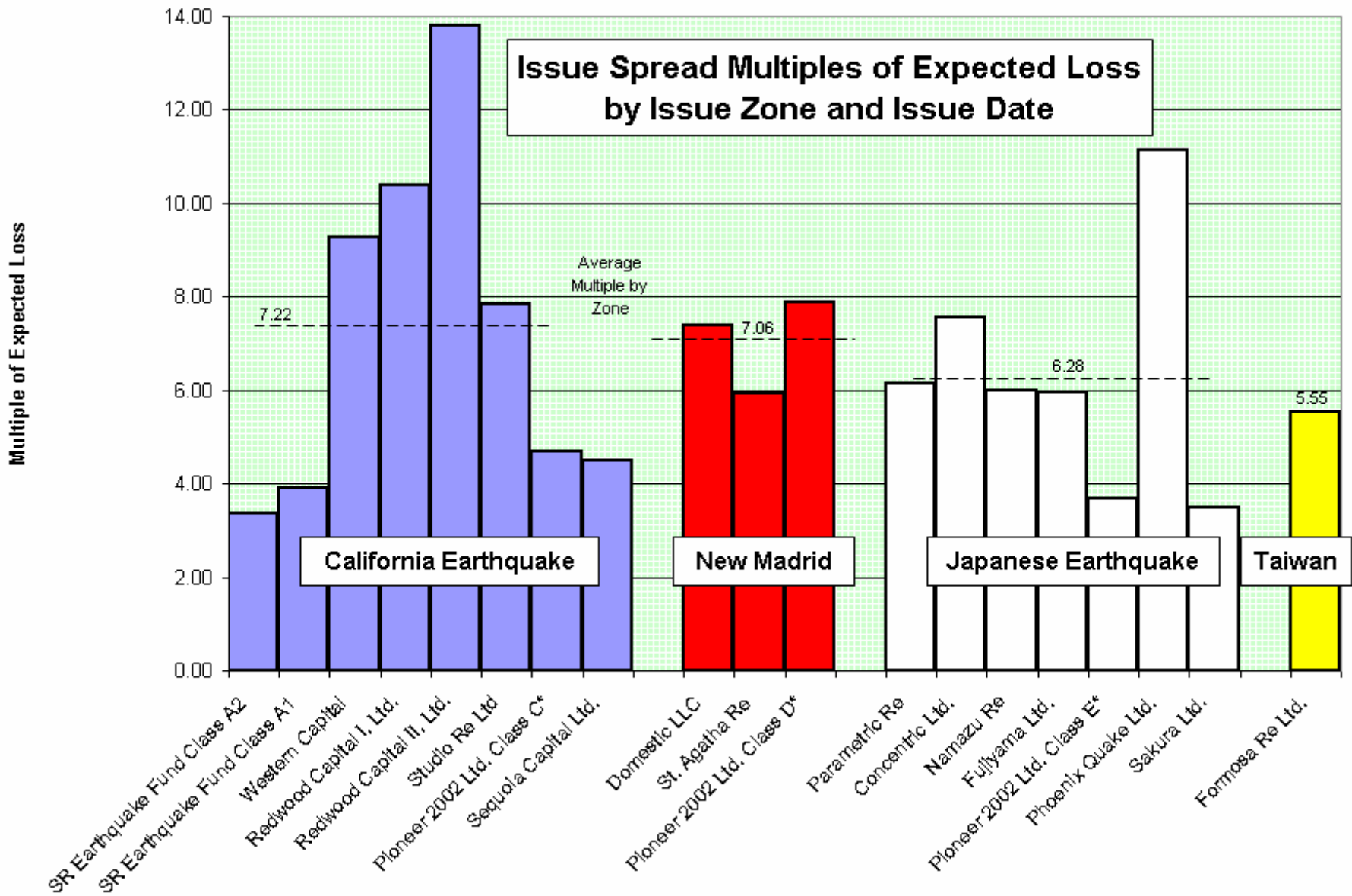
$$\text{Price} = \text{EL} + \gamma * (\text{PFL}^{\alpha}) * (\text{CEL}^{\beta})$$

## Regression Results for the LFC Model (Selectively 2000-3)

All Initial Issues (Annually)	Gamma	Alpha	Beta
LFC 2000	0.555	0.495	0.574
LFC 2001	0.431	0.474	0.326
Selective* Secondary Market	Gamma	Alpha	Beta
9/30/2001	0.475	0.504	-0.091
12/31/2001	0.271	0.400	-0.253
3/31/2002	0.312	0.422	0.002
6/30/2002	0.321	0.445	-0.101
Earthquake Only (Initial Issue)	Gamma	Alpha	Beta
1997-2003	0.192	0.352	0.111

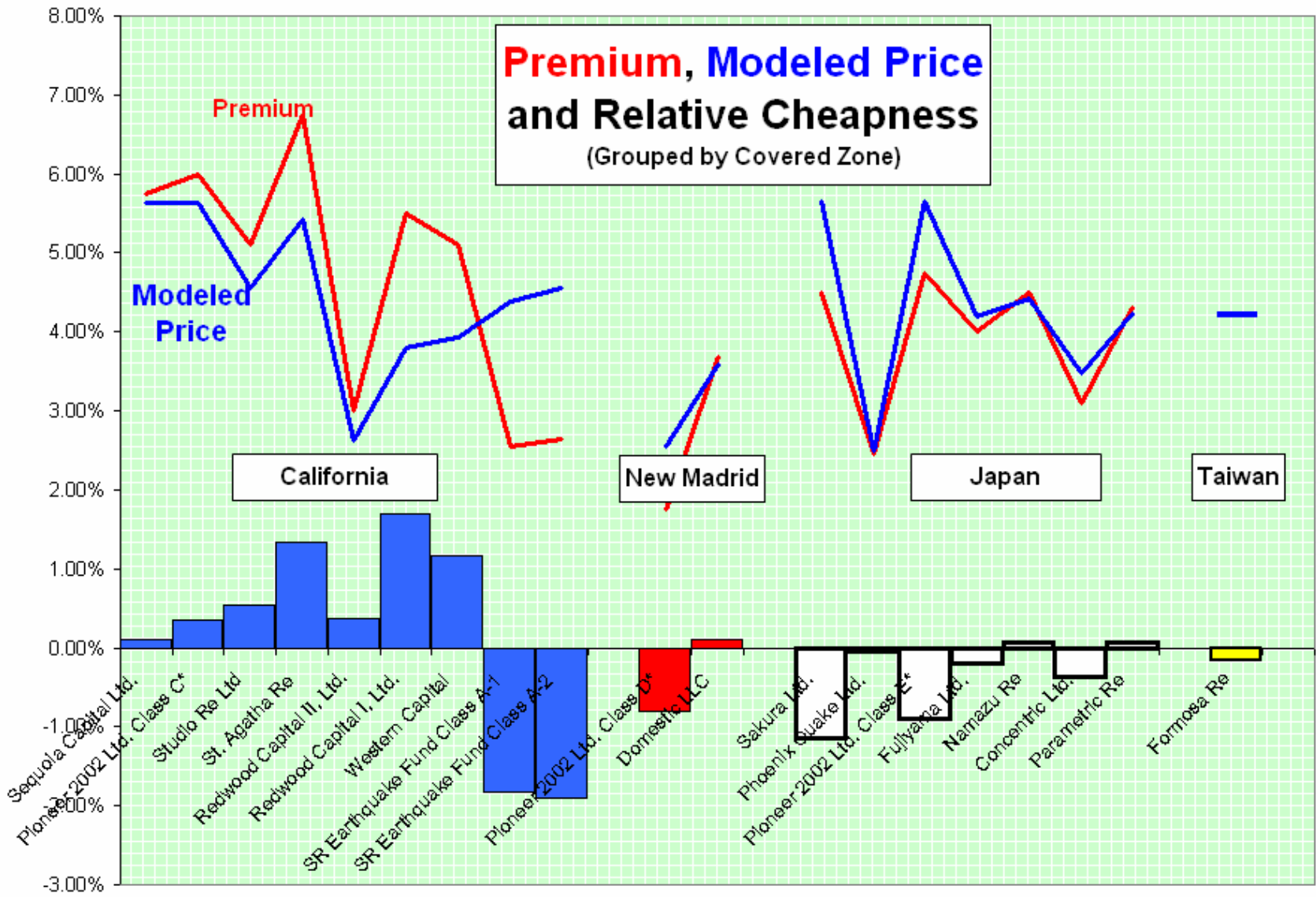
\* Certain secondary market issues are dropped from regressions if there significant seasonalities or maturities that may distort prices.





# Premium, Modeled Price and Relative Cheapness

(Grouped by Covered Zone)



# VITA Capital Ltd

Term		3 Year
Coupon	L3+	135 Basis Points
Risk		Mortality Risk US UK France Switzerland and Italy
Issue Date		2003 December
Placement Agent		Swiss Re Capital Markets
Cedent		Swiss Re
Risk Profile		
Expected Loss		0.016%
Attachment Prob		0.077%
Exhaustion Prob		0.003%

# LFC PRICING MODEL

## DATA

PFL 0.077%

EL 0.016%

PLL 0.003%

CEL = EL / PFL

CEL 20.78%

## Premium Calculation

		<b><math>\gamma</math></b>	<b><math>\alpha</math></b>	<b><math>\beta</math></b>
Parameters		0.192	0.352	0.111
Premium	=			
	<b>EL</b>	<b>+</b>	<b><math>\gamma</math></b>	<b>* (PFL)<sup><math>\alpha</math></sup> * (CEL)<sup><math>\beta</math></sup></b>
	<b>EL</b>	<b>+</b>	<b>0.192</b>	<b>0.0802</b>
	<b>0.016%</b>	<b>+</b>	<b>1.29%</b>	
				<b>1.309%</b>

VITA is 5 Basis Points "Cheap" to The Market

Empirical Models obviously Need to be  
Adjusted for

Zones of Coverage

Seasonality

Layer or Multi/Single-Peril Structure

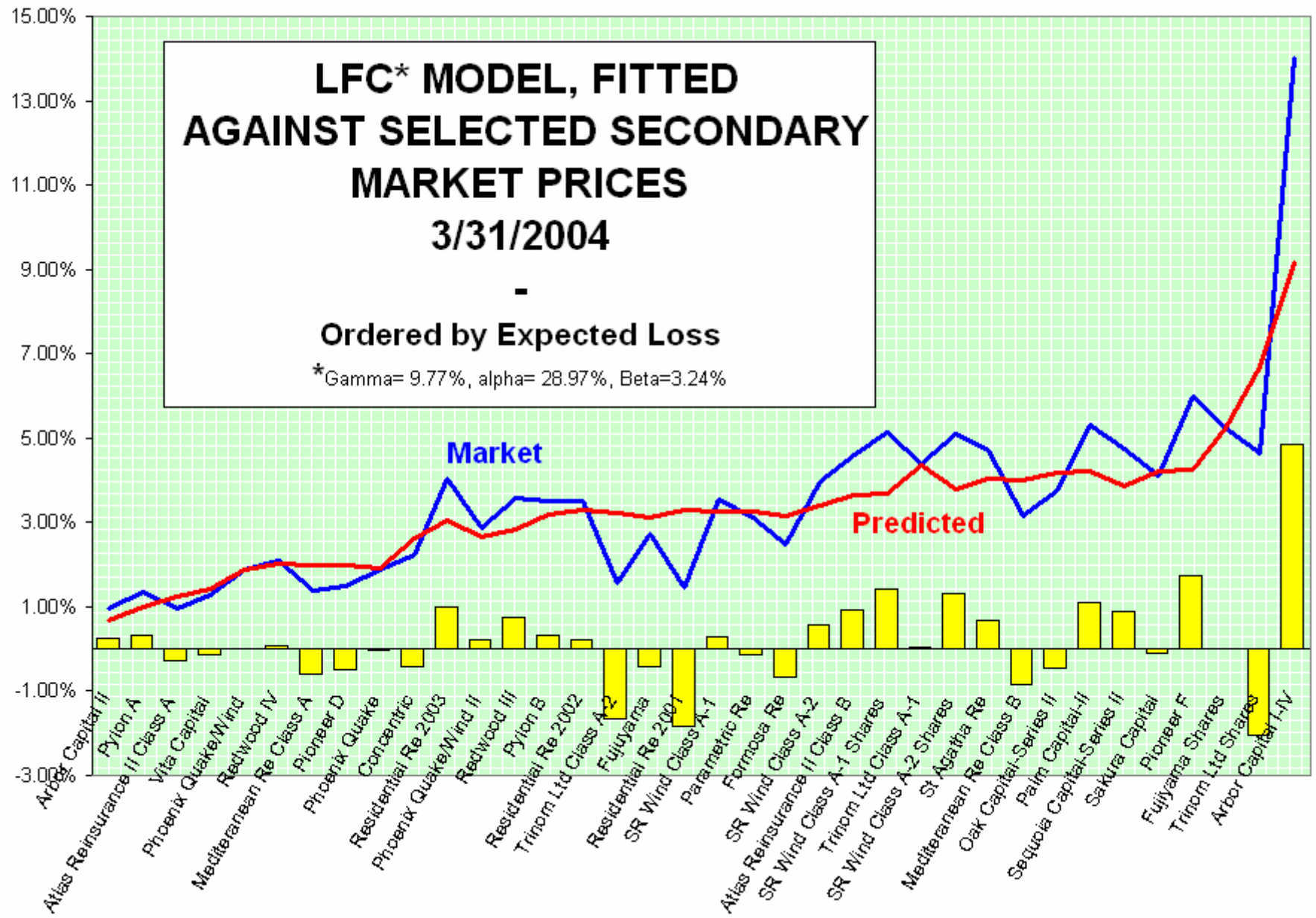
Considerations

# LFC\* MODEL, FITTED AGAINST SELECTED SECONDARY MARKET PRICES

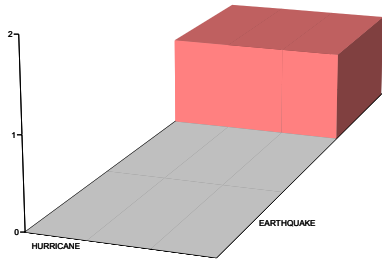
3/31/2004

Ordered by Expected Loss

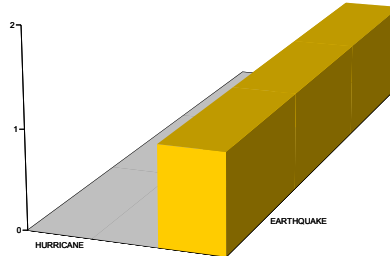
\*Gamma= 9.77%, alpha= 28.97%, Beta=3.24%



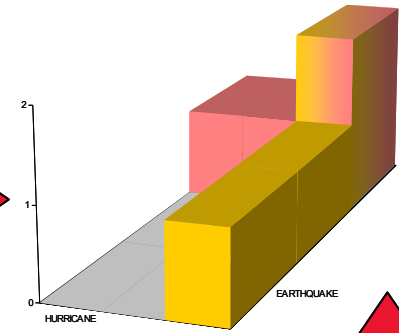
# EQUIVALENT HORIZONTAL AND VERTICAL COVER COMBINATIONS



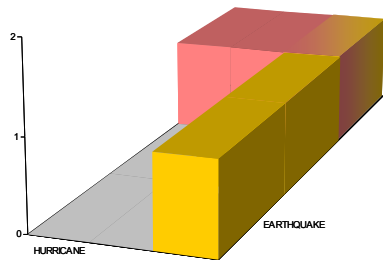
**SINGLE PERIL**  
Earthquake Bond



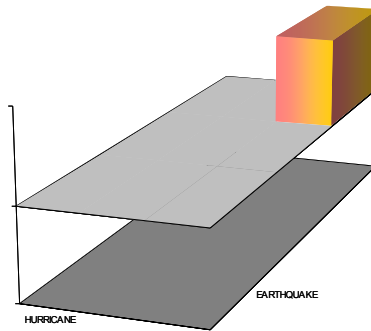
**SINGLE PERIL**  
Hurricane Bond



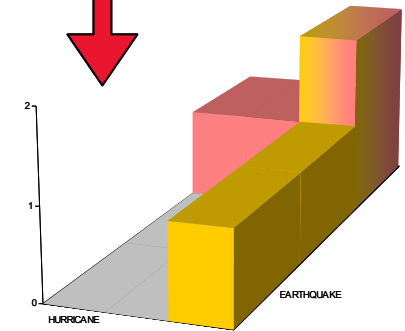
**IDENTICAL**  
**COMBINED**  
**RISK**  
**PORTFOLIOS**

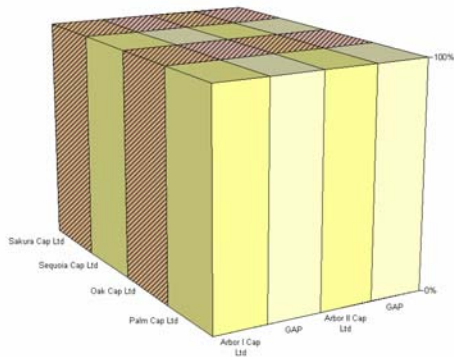


**MULTI-PERIL EQ+HURR BOND**  
In this ILW example, the junior tranche is the equivalent of a First-Event Cover.



**MULTI-PERIL EQ+HURR BOND**  
In this ILW example, the senior tranche is The equivalent of a Second-Event Cover





		7/23/2003			
		Premium	Expected Loss	Std Dev	
<b>PALM</b>		5.75%	1.261%	10.69%	BB+
<b>OAK</b>		4.75%	1.255%	10.75%	BB+
<b>SEQUOIA</b>		5.75%	1.259%	10.68%	BB+
<b>SAKURA</b>		4.50%	1.271%	10.72%	BB+
<b>Sum</b>		20.75%	5.047%	21.38%	
<b>Average Coupon</b>		5.19%			
	<b>Layer</b>				
<b>Arbor I</b>	0-100%	15.50%	4.96149%	20.82%	B
<b>GAP</b>	1-200%	?	0.08311%	2.68%	? BBB
<b>Arbor II</b>	2-300%	1.00%	0.00190%	0.43%	A+
<b>GAP</b>	3-400%	?	0.00000%	0.00%	? AAA
		20.75%	5.04650%		

Specific Simulation 100,000 runs may not replicate Swiss Re's results

**EXPECTED VALUES FOLLOW THE ALGEBRA**

**CAN ALLOCATIONS OF LOAD BE SET SO THAT  
IT ALSO FOLLOWS THE ALGEBRA?**

**END**

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