



U.S. P&C Insurance Industry Strength With Comments on Risk Preference

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Mounting Pressure



Existing Capital Adequacy Measures

- **RBC (Risk-Based Capital) Ratio**
 - Implemented by the NAIC in the 1990s
 - Formulaic estimate of necessary surplus and comparison to reported surplus
 - Used to authorize regulatory intervention into financially-distressed companies' management
 - Increasingly obsolete
 - NAIC is currently circulating a discussion draft of a model act for requiring an ORSA (Own Risk and Solvency Assessment) for companies with at least \$500M written premium or belonging to a group with at least \$1B written premium, effective January 1, 2014
- **Rating Agency Measures: BCAR (A.M. Best), S&P CAR (Standard and Poor's), MCAR (Moody's)**
 - Both formulaic and simulation-based
 - Used as significant input into assignment of financial strength ratings
 - Lack full transparency, as not all parameters are made public
- **Internal Economic Capital Models (ECMs)**
 - Consultants are available to build these models for sizable consulting fees
 - Only the largest P&C companies can afford to develop these models with internal company resources
 - Owners of fully developed ECMs often question whether the parameterization is comparable to industry norms

Motivation

- According to A.M. Best (from the 2010 ERM SRQ):
 - Just 28% of respondents use an ECM to quantify aggregate risk.
 - The breakdown by rating unit size: Large (55%), Medium (33%), and Small (17%).
 - Only 8% of the industry is using an ECM to affect management compensation.
- The NAIC is catching up with the European regulator EIOPA, which under Solvency II will begin allowing companies capital relief if they opt out of a standard formula through development of an internal ECM.
- Investors, media, and the financial community are increasingly savvy with the language of risk modeling (VaR, PML, etc.) and are therefore demanding more disclosure of metrics from ECMs.
- Developing an ECM is costly because it requires:
 - Actuarial and financial expertise
 - Collection of significant volume of data
 - Analysis of data to develop risk parameters
 - Licensing of an ECM software platform
 - Licensing of an Economic Scenario Generator (ESG)
 - Validation of the model and organizing the management process for audit
- **Economic Capital Modeling on the entire industry will provide:**
 - **Reference points for companies without individual models**
 - **Facilitation of industry discussions on risk preference**
 - **Insight into implications of existing adequacy measures**

A Brief Background on Economic Capital Modeling

- Cash flow modeling for assessing variations from mortality assumptions used to price life insurance and annuities originated in the life insurance industry
- P&C insurance companies began building and testing Dynamic Financial Analysis (DFA) models in the 90s
- The term in vogue is 'Economic Capital Modeling,' which in its best form is a probability-based scenario generator for future financial results of an insurance enterprise.
- Key risks modeled in a full ECM include underwriting risk, reserve risk, natural catastrophe risk, asset risk, and credit risk.
- The critical factor in aggregating these risks into a common model and producing plausible alternative financial outcomes (e.g. balance sheets, income statements) is the **correlation** between the risks.

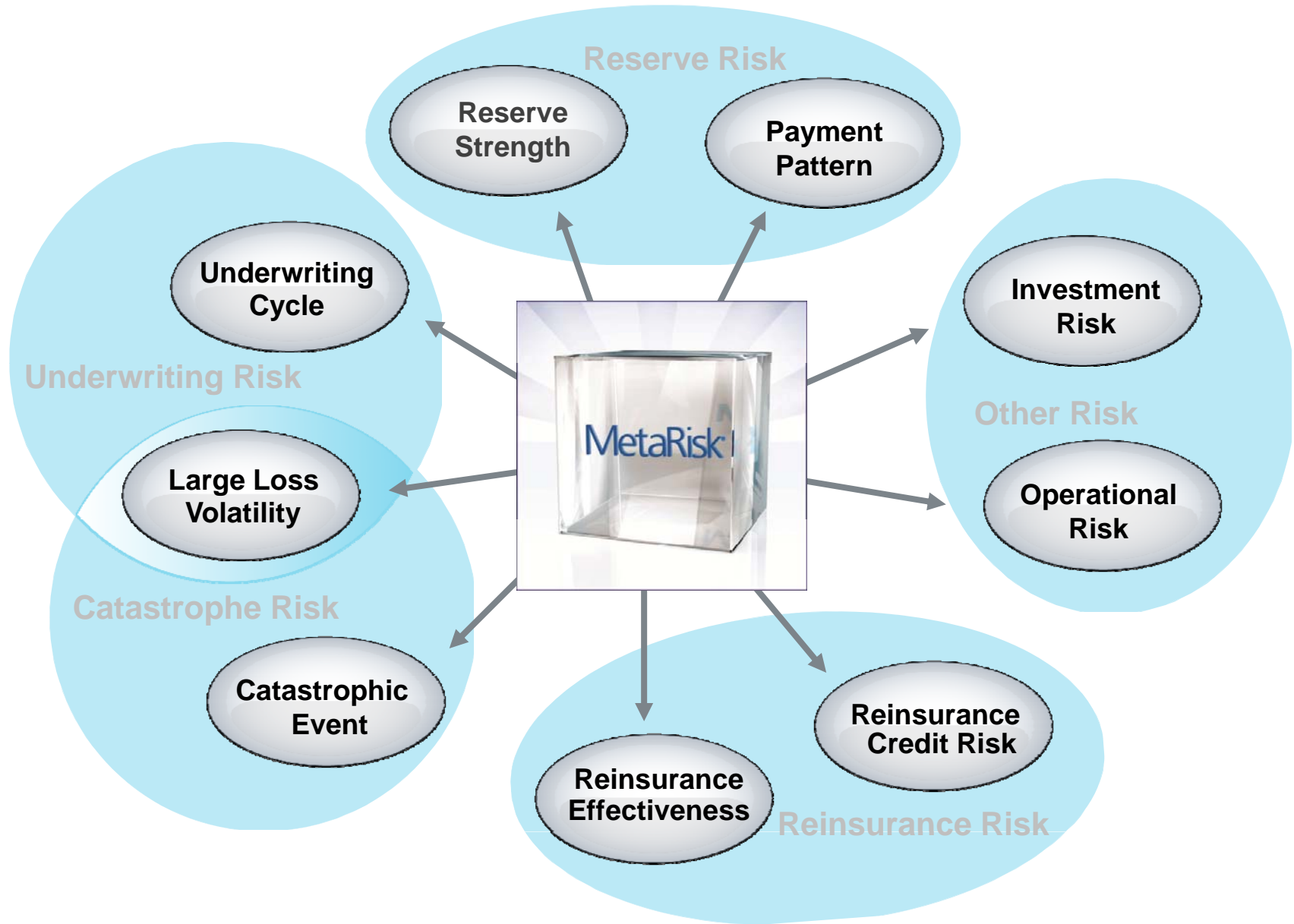
Guy Carpenter/Risk Lighthouse Industry Risk Benchmarks Research

- Data Sources: SNL, NAIC, A.M. Best, Ill.org
- Significant effort invested into data validation and correction
- Accident Year 1980 to 2010 (reported as of 1989 to 2010)
- Gross and net of reinsurance
- Available parameterization:
 - Pricing risk (loss ratio volatility)
 - Reserve risk (adverse/benign reserve development)
 - Payment pattern volatility
 - Correlation between lines of business
- Definition of market segments:
 - Large National
 - Super Regional
 - Regional
 - Specialty
 - Reinsurer
 - Other



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August 24, 2011*

MetaRisk is a Comprehensive Economic Capital Model



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Overview

- The model we will introduce is constructed on the MetaRisk® platform from:
 - Risk parameters from the Industry Risk Benchmarks research
 - 2010 Statutory filing data downloaded from SNL:
 - Balance Sheet, Income Statement, U&I Exhibit
 - Asset detail from Schedule D
 - Reserve detail from Schedule P
- We have aggregated companies together to construct as-if enterprises for the following market segments: Industry Total, Large National, and Small Regional
- The model produces equally-likely, alternate versions of financial statements for one prospective year of each segment performance.
- 1-Year Reserve volatility is benchmarked to industry reserve experience
- Property cat modeling is AIR Version 13 for industry HU and EQ perils, each on three lines of business: commercial property, residential property, and auto physical damage.

Model Specification

Opening Balance Sheet – Industry Total

These amounts have full underlying detail (see subsequent slides)

Millions

Assets from Balance Sheet(s)		Liabilities from Balance Sheet(s)	
Total Bonds	791,046.7	Gross Loss & LAE Reserves	719,290.8
Total Stocks	214,758.6	Ceded Loss & LAE Reserves	187,980.5
Property	8,959.7	Net Loss & LAE Reserves	531,310.2
Cash	69,094.4		
Other Invested Assets	116,230.0	Gross Unearned Premium Reserves	207,852.3
Total Cash & Invested Assets	1,200,089.3	Ceded Unearned Premium Reserves	27,719.4
		Net Unearned Premium Reserves	180,132.9
Uncollected Premium	91,187.7		
		Other Liabilities	142,336.3
		Total Liabilities	853,779.5
		Surplus Notes	13,756.5
		Capital & Surplus	501,566.6
		Policyholder Surplus	515,323.1
Other Assets	77,825.5		
Total Assets	1,369,102.6	Total Liabilities & Policyholder Surplus	1,369,102.6

Model Specification

Reserve Distribution and Durations – Industry Total

Lines of business follow Schedule P definition with some aggregation.

LOB	Gross Reserves	Duration	Estimated 2011 Payment
1. Homeowners/Farmowners (A)	22,943,189,000	1.02	14,265,924,094
2. Private Passenger Auto Liability (B)	112,431,263,000	1.82	53,765,558,278
3. Commercial Auto Liability (C)	29,097,954,000	2.60	10,615,358,334
4. Workers Compensation (D)	145,185,845,000	4.55	25,588,618,331
5. Commercial Multi-Peril (E)	41,329,449,000	2.40	12,521,670,039
6. General Liability (H1,H2)	178,418,398,000	4.73	34,734,050,768
7. All Other Liability Lines (F1,F2,G,O,R1,R2)	114,257,848,000	4.95	20,525,577,242
8. All Other Short-Tailed (I,K,L,M,N,P,S,T)	70,304,490,000	1.50	33,708,156,429
9. Auto Physical Damage (J)	5,322,325,000	0.56	5,067,902,277
Total	719,290,761,000	3.59	210,792,815,792

Model Specification

Direct and Assumed Pricing Assumptions – Industry Total

- ELR is the seven-year weighted average of ultimate burning cost
- Net volatility is a measure of the variability of the actual loss ratio
- We assume no growth in written premium between 2010 and 2011
- Natural catastrophe losses modeled explicitly via AIR event files are segregated from attritional losses for each line of business.

Summary

Cat AAL: **15,284,955,746**

LOB	Exp 2011 D&A EP	Expected 2011 Total Loss and LAE Ratio	Cat Alloc	xCat Vol	xCat 2011 ELR
1. Homeowners/Farmowners (A)	67,509,076,176	68%	49%	14%	57%
2. Private Passenger Auto Liability (B)	79,700,970,507	72%		5%	72%
3. Commercial Auto Liability (C)	16,652,416,318	63%		3%	63%
4. Workers Compensation (D)	26,286,178,942	73%		9%	73%
5. Commercial Multi-Peril (E)	30,150,733,901	61%	48%	13%	37%
6. General Liability (H1,H2)	41,878,595,632	68%		11%	68%
7. All Other Liability Lines (F1,F2,G,O,R1,R2)	21,064,325,763	66%		10%	66%
8. All Other Short-Tailed (I,K,L,M,N,P,S,T)	81,098,555,526	71%		28%	71%
9. Auto Physical Damage (J)	56,244,573,475	61%	3%	4%	61%
Total	420,585,426,239	68%	100%		64%
	Expense Ratio (to EP)	36%			

Model Specification

Reserve Volatility – Industry Total

- Calendar-year reserve volatility for a single period is calibrated to twenty years of industry history, adjusted for cycle.
- Volatility is correlated between lines via medical inflation dependencies.
- We have not differentiated reserve volatility between the defined market segments.

LOB	Name	Net Carried Reserves	Volatility to Prior Year Reserves
1	Homeowners/Farmowners	20,845,145,000	4.70%
2	Private Passenger Auto Liability	91,154,906,000	1.42%
3	Commercial Auto Liability	22,536,684,000	1.43%
4	Workers Compensation	106,409,433,000	1.69%
5	Commercial Multi-Peril	34,775,133,000	1.87%
6	General Liability	121,953,971,000	2.33%
7	All Other Liability Lines	78,138,755,000	3.09%
8	All Other Short-Tailed	50,705,309,000	CPI-Linked
9	Auto Physical Damage	4,790,878,000	CPI-Linked
Total		531,310,214,000	

Model Specification

Fixed Income Asset Profile – Industry Total

- This asset profile from 2010 Schedule D is used in conjunction with an economic scenario generator (ESG) to simulate asset performance.
- Equity holdings are modeled to perform according to the modeled performance of the S&P 500.
- See Appendix for full fixed income asset profile

Market Value								
	AAA	AA	A	BBB	BB	B Total		Pct
Government	20,760,504,206	-	-	-	-	-	20,760,504,206	2.5%
Municipal	395,638,434,918	11,744,549,191	1,019,712,961	201,509,412	513,832,028	163,600,139	409,281,638,649	49.9%
Corporate	260,771,520,226	96,923,603,782	13,600,156,217	14,331,400,084	3,259,564,318	1,188,686,526	390,074,931,154	47.6%
Total	677,170,459,350	108,668,152,973	14,619,869,179	14,532,909,497	3,773,396,346	1,352,286,664	820,117,074,009	
Pct	82.6%	13.3%	1.8%	1.8%	0.5%	0.2%		

Average Time to Maturity								
	AAA	AA	A	BBB	BB	B Total		
Government	5.2							5.2
Municipal	8.0	9.9	15.0	13.2	9.7	11.1		8.1
Corporate	5.2	6.4	8.3	6.9	5.5	8.7		5.7
Total	6.9	6.8	8.7	7.0	6.1	9.0		6.9

Model Specification

Opening Balance Sheet Summary By Segment

- Composition of the segment definitions can be found in the Appendix.
- Large National companies comprise approximately 70% of the industry as we have defined it.
- Small Regional companies tend to invest in less equities.

Balance Sheet Item	Industry		Large National		Small Regional	
Total Bonds	791,029.4	57.8%	517,794.1	53.9%	84,166.0	68.2%
Total Stocks	220,543.3	16.1%	177,106.8	18.4%	12,094.1	9.8%
Total Assets	1,369,102.6	100.0%	960,618.7	100.0%	123,432.8	100.0%
Net Loss & LAE Reserves	531,310.2	62.2%	370,545.9	62.2%	45,354.3	59.1%
Net Unearned Premium Reserves	180,132.9	21.1%	123,171.8	20.7%	19,606.7	25.6%
Total Liabilities	853,779.5	100.0%	596,192.7	100.0%	76,703.0	100.0%
Policyholder Surplus	515,323.1		364,426.0		46,729.9	

Model Specification

Reserve Distribution and Duration Summary By Segment

- Workers Comp is the only line which demonstrates a meaningful difference in the payment pattern when comparing the Large National Segment to the Small Regional Segment
- Many specialty liability companies explain the larger proportion of LOB 7 in the Small Regional segment

LOB	Industry			Large National			Small Regional		
1. Homeowners/Farmowners (A)	22,943,189,000	1.0	3.2%	16,081,431,000	1.0	3.3%	2,479,070,000	1.2	4.2%
2. Private Passenger Auto Liability (B)	112,431,263,000	1.8	15.6%	80,886,297,000	1.8	16.7%	7,773,735,000	1.7	13.2%
3. Commercial Auto Liability (C)	29,097,954,000	2.6	4.0%	18,536,479,000	2.6	3.8%	2,808,905,000	2.5	4.8%
4. Workers Compensation (D)	145,185,845,000	4.6	20.2%	106,048,279,000	4.7	21.9%	14,203,598,000	3.8	24.1%
5. Commercial Multi-Peril (E)	41,329,449,000	2.4	5.7%	28,595,747,000	2.3	5.9%	4,579,220,000	2.2	7.8%
6. General Liability (H1,H2)	178,418,398,000	4.7	24.8%	136,348,912,000	4.7	28.2%	6,968,039,000	4.4	11.8%
7. All Other Liability Lines (F1,F2,G,O,R1,R2)	114,257,848,000	4.9	15.9%	59,557,351,000	4.6	12.3%	16,779,756,000	4.7	28.5%
8. All Other Short-Tailed (I,K,L,M,N,P,S,T)	70,304,490,000	1.5	9.8%	33,678,562,000	1.4	7.0%	3,013,388,000	1.4	5.1%
9. Auto Physical Damage (J)	5,322,325,000	0.6	0.7%	4,122,947,000	0.6	0.9%	359,771,000	0.6	0.6%
Total	719,290,761,000		100.0%	483,856,005,000		100.0%	58,965,482,000		100.0%

Model Specification

Direct and Assumed Pricing Assumptions Summary By Segment

- Approximately 80% of the industry is represented by our two segment definitions
- In general, the loss ratio volatility for small regional companies is lower
- Poor performance of several niche companies contributes to the overall higher expected loss ratio for the Small Regional segment

Line of Business	Expected 2011 Direct and Assumed EP				2011 Expected Loss Ratio			Volatility		
	Industry	% Large	% Small	% Other	Industry	Large	Small	Industry	Large	Small
		National	Regional	Segments		National	Regional		National	Regional
1. Homeowners/Farmowners (A)	67,509,076,176	70%	11%	19%	68%	67%	69%	14%	17%	14%
2. Private Passenger Auto Liability (B)	79,700,970,507	72%	9%	19%	72%	72%	72%	5%	5%	5%
3. Commercial Auto Liability (C)	16,652,416,318	63%	11%	26%	63%	62%	63%	3%	3%	3%
4. Workers Compensation (D)	26,286,178,942	65%	16%	18%	73%	73%	72%	9%	10%	10%
5. Commercial Multi-Peril (E)	30,150,733,901	69%	12%	19%	61%	61%	63%	13%	15%	12%
6. General Liability (H1,H2)	41,878,595,632	74%	6%	20%	68%	69%	62%	11%	12%	10%
7. All Other Liability Lines (F1,F2,G,O,R1,R2)	21,064,325,763	54%	21%	24%	66%	65%	73%	10%	11%	9%
8. All Other Short-Tailed (I,K,L,M,N,P,S,T)	81,098,555,526	67%	9%	24%	71%	63%	87%	28%	34%	35%
9. Auto Physical Damage (J)	56,244,573,475	69%	9%	22%	61%	62%	63%	4%	4%	5%
	420,585,426,239	69%	10%	21%	68%	67%	71%			

Model Specification

Fixed Income Asset Profile – Summary By Segment

Large National

Market Value								
	AAA	AA	A	BBB	BB	B Total		Pct
Government	13,332,289,352	-	-	-	-	-	13,332,289,352	2.5%
Municipal	264,400,016,581	7,474,024,277	755,959,102	141,759,096	358,041,168	73,978,256	273,203,778,481	50.8%
Corporate	160,739,874,745	65,354,860,497	10,178,521,922	12,278,862,781	2,348,795,429	649,727,381	251,550,642,754	46.7%
Total	438,472,180,678	72,828,884,774	10,934,481,024	12,420,621,877	2,706,836,597	723,705,637	538,086,710,586	
Pct	81.5%	13.5%	2.0%	2.3%	0.5%	0.1%		

Average Time to Maturity								
	AAA	AA	A	BBB	BB	B Total		
Government	4.7						4.7	
Municipal	8.3	10.2	15.5	15.4	9.9	14.1	8.3	
Corporate	5.3	6.3	8.6	6.9	5.1	8.5	5.7	
Total	7.1	6.7	9.1	7.0	5.7	9.1	7.0	

Small Regional

Market Value								
	AAA	AA	A	BBB	BB	B Total		Pct
Government	3,369,640,359	-	-	-	-	-	3,369,640,359	3.9%
Municipal	42,998,254,482	1,326,902,011	61,428,623	14,181,098	7,055,173	13,708,188	44,421,529,575	51.1%
Corporate	29,665,754,627	7,707,407,091	956,217,577	423,190,050	88,211,452	315,580,483	39,156,361,280	45.0%
Total	76,033,649,467	9,034,309,102	1,017,646,201	437,371,148	95,266,624	329,288,672	86,947,531,214	
Pct	87.4%	10.4%	1.2%	0.5%	0.1%	0.4%		

Average Time to Maturity								
	AAA	AA	A	BBB	BB	B Total		
Government	5.6						5.6	
Municipal	7.3	8.2	11.0	9.9	12.6	7.7	7.3	
Corporate	5.2	6.9	6.9	7.3	5.9	8.0	5.6	
Total	6.4	7.1	7.2	7.3	6.4	8.0	6.5	

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Results and Implications

Inherent Risk

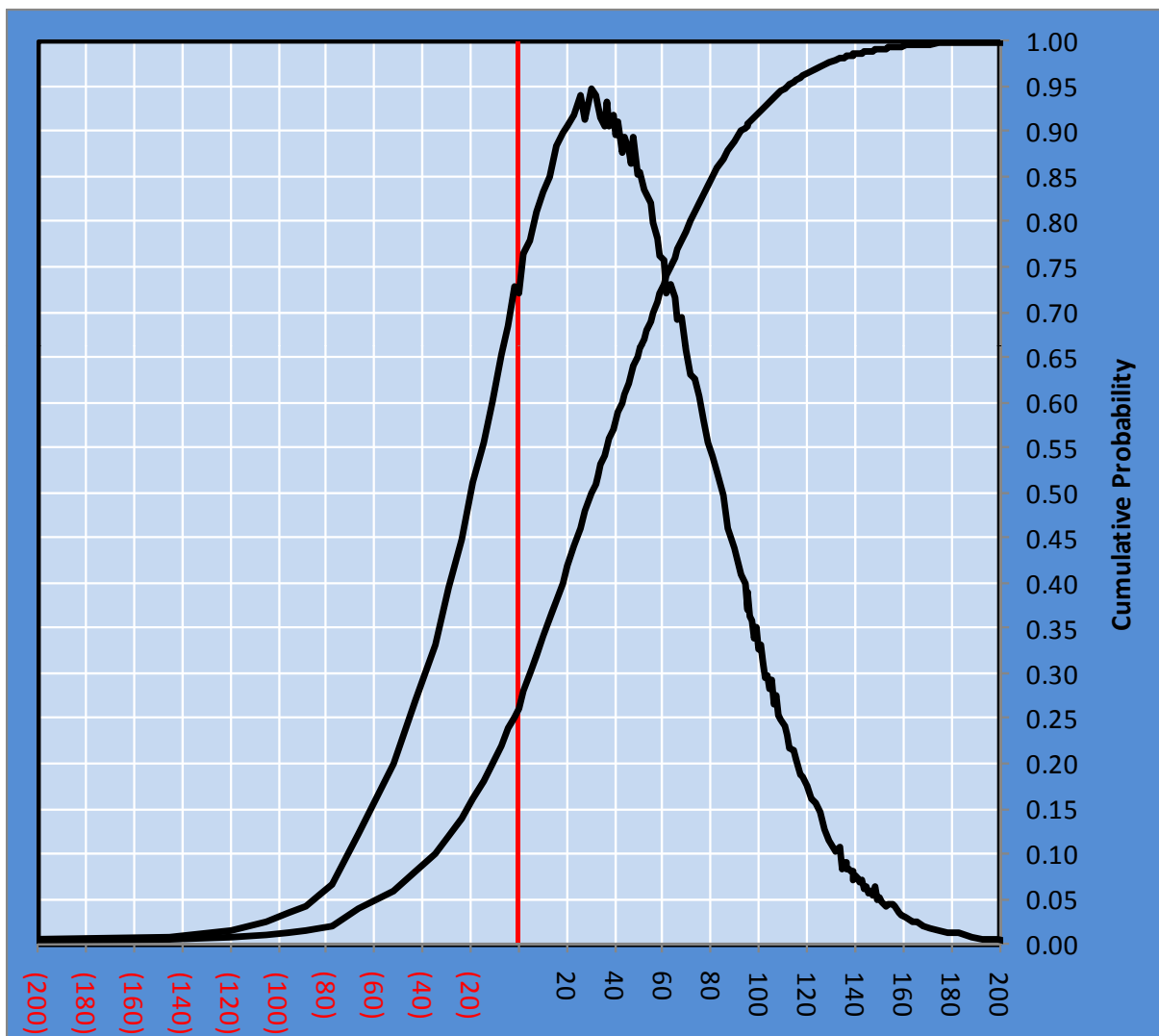
- We'll start by simulating change in GAAP equity without reinsurance.
- This 'naked' view provides the best understanding of the inherent risk of the business.
- Fixed income securities are stated at market value and therefore sensitive to changes in interest rates.
- The correlation between interest rates and inflation induces correlation between fixed income assets and reserve liabilities.
- We'll categorize and rank the risk sources.

Results and Implications

Change in GAAP Equity - Industry

- Positive expected ROE is driven by both positive underwriting return and positive return on investments.
- We'll look at the contributions to overall volatility next.

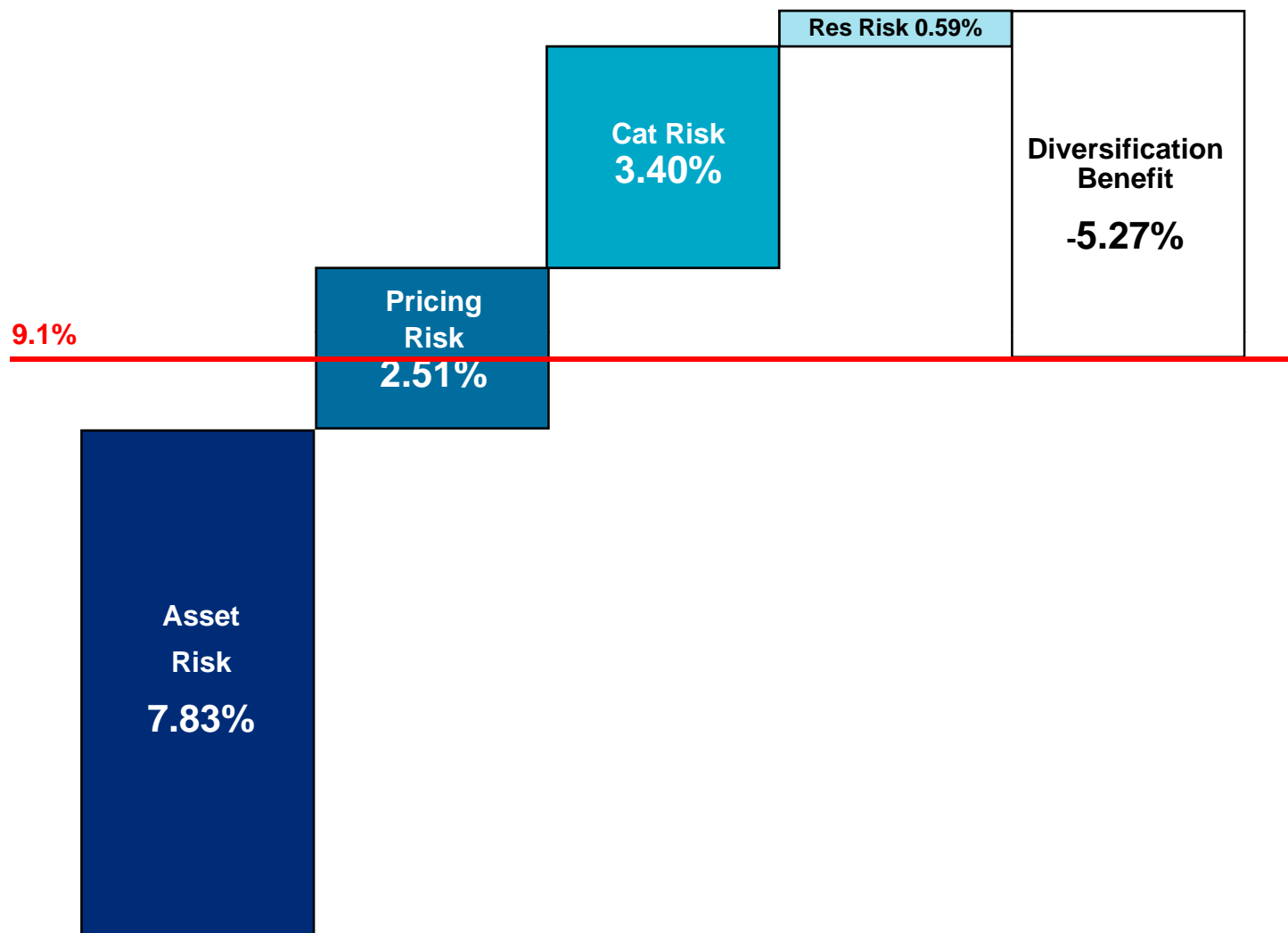
Mean Change in GAAP Equity	30.8 B
Mean ROE (Post Tax)	5.8%
Coefficient of Variation	9.1%
P[Change<0]	25.5%



Results and Implications

Composition of GAAP Equity Volatility- Industry

- Let's build up the 9.1% CV of GAAP Equity from the various sources of risk.
- Asset risk (interest rate exposure) is by far the largest source.
- Pricing risk (loss ratio uncertainty on incoming business) is important, but would be more significant in a multi-year model with cycle.
- Cat risk poses the largest insurance source of 1-year volatility.
- Reserve volatility is relatively minor over the short time horizon.
- Diversification of the risk sources is significant.



Results and Implications

Tail Value at Risk (TVaR) Industry

- This chart displays TVaR, the average incurred loss result for all simulations larger than a given total threshold.
- TVaR can be broken down to line of business because we know the individual line losses on each simulation.
- Natural catastrophes drive the tail results on a gross basis
- We can allocate capital based on line contributions to a chosen TVaR metric.

Line of Business	Gross (Inherent) Loss and LAE					
	Return Period					
	4	10	50	100	200	250
Homeowners/Farmowners (A)	39.6	39.6	39.2	39.0	38.9	39.0
Private Passenger Auto Liability (B)	57.4	57.4	57.4	57.3	57.3	57.2
Commercial Auto Liability (C)	10.4	10.4	10.4	10.4	10.4	10.4
Workers Compensation (D)	19.3	19.3	19.3	19.2	19.2	19.2
Commercial Multi-Peril (E)	11.1	11.1	11.1	11.1	11.1	11.1
General Liability (H1,H2)	28.9	28.9	28.7	28.7	28.6	28.5
All Other Liability Lines (F1,F2,G,O,R1,R2)	14.0	14.0	14.0	14.0	14.0	14.1
All Other Short-Tailed (I,K,L,M,N,P,S,T)	71.8	74.5	69.7	67.9	67.6	67.3
Auto Physical Damage (J)	34.1	34.1	34.1	34.0	34.0	34.1
Res_Prop_HU	14.6	23.1	47.0	59.5	73.0	78.0
Comm_Prop_HU	13.0	20.8	42.7	54.2	65.7	68.2
Auto_HU	0.5	0.5	0.4	0.4	0.4	0.4
Res_Prop_EQ	1.9	3.0	4.7	4.7	3.9	4.0
Comm_Prop_EQ	3.8	6.4	12.3	13.3	12.8	12.7
Auto_EQ	0.0	0.0	0.0	0.0	0.0	0.0
Total TVaR	320.5	343.1	391.0	413.8	436.9	444.3

Net (Residual) Loss and LAE Cat Included with Source Lines

	Return Period					
	4	10	50	100	200	250
	48.0	48.9	50.0	50.3	50.6	50.7
	56.3	56.6	56.8	56.9	57.0	57.1
	9.5	9.5	9.5	9.5	9.5	9.5
	17.5	17.5	17.7	17.7	17.8	17.8
	17.5	17.6	17.7	17.7	17.7	17.8
	25.2	25.4	25.7	25.7	25.7	25.7
	12.1	12.1	12.2	12.1	12.1	12.1
	61.3	66.8	75.6	79.1	82.5	83.5
	33.9	34.0	34.1	34.2	34.2	34.2
	281.2	288.5	299.2	303.3	307.2	308.3

•To arbitrate between the competing functions of capital to buffer short-term volatility and to insure against extreme scenarios, we'll evenly weight two levels of TVaR together: 1 in 10 and 1 in 250.

•More on the implications of these choices in Section 4

Results and Implications

Capital Allocation and Premium-to-Surplus Industry

- The effect on reinsurance in dampening the spread of premium-to-surplus ratios is significant
- In a multi-year model, casualty lines would demonstrate more risk

Gross (Inherent) Loss and LAE

Line of Business	Return Period			Allocated Surplus	Expected WP	Premium-to-Surplus
	4	200	Ave			
Homeowners/Farmowners (A)	18%	27%	22%	113.4	68.6	0.61
Private Passenger Auto Liability (B)	18%	13%	16%	80.0	98.9	1.24
Commercial Auto Liability (C)	3%	2%	3%	14.5	17.9	1.23
Workers Compensation (D)	6%	4%	5%	26.8	33.4	1.24
Commercial Multi-Peril (E)	9%	20%	15%	75.2	32.7	0.43
General Liability (H1,H2)	9%	7%	8%	40.1	47.2	1.18
All Other Liability Lines (F1,F2,G,O,R1,R2)	4%	3%	4%	19.5	25.1	1.28
All Other Short-Tailed (I,K,L,M,N,P,S,T)	22%	15%	19%	97.6	88.2	0.90
Auto Physical Damage (J)	11%	8%	9%	48.2	68.9	1.43
Total TVaR	100%	100%	100%	515.3	480.9	0.93

Net (Residual) Loss and LAE

Line of Business	Return Period			Allocated Surplus	Expected WP	Premium-to-Surplus
	4	200	Ave			
Homeowners/Farmowners (A)	17%	16%	17%	86.4	68.6	0.79
Private Passenger Auto Liability (B)	20%	19%	19%	99.5	98.9	0.99
Commercial Auto Liability (C)	3%	3%	3%	16.7	17.9	1.07
Workers Compensation (D)	6%	6%	6%	30.9	33.4	1.08
Commercial Multi-Peril (E)	6%	6%	6%	30.9	32.7	1.06
General Liability (H1,H2)	9%	8%	9%	44.6	47.2	1.06
All Other Liability Lines (F1,F2,G,O,R1,R2)	4%	4%	4%	21.3	25.1	1.18
All Other Short-Tailed (I,K,L,M,N,P,S,T)	22%	27%	24%	125.4	88.2	0.70
Auto Physical Damage (J)	12%	11%	12%	59.7	68.9	1.15
Total TVaR	100%	100%	100%	515.3	480.9	0.93

Results and Implications

Capital Allocation Between Cat and Non-Cat Industry

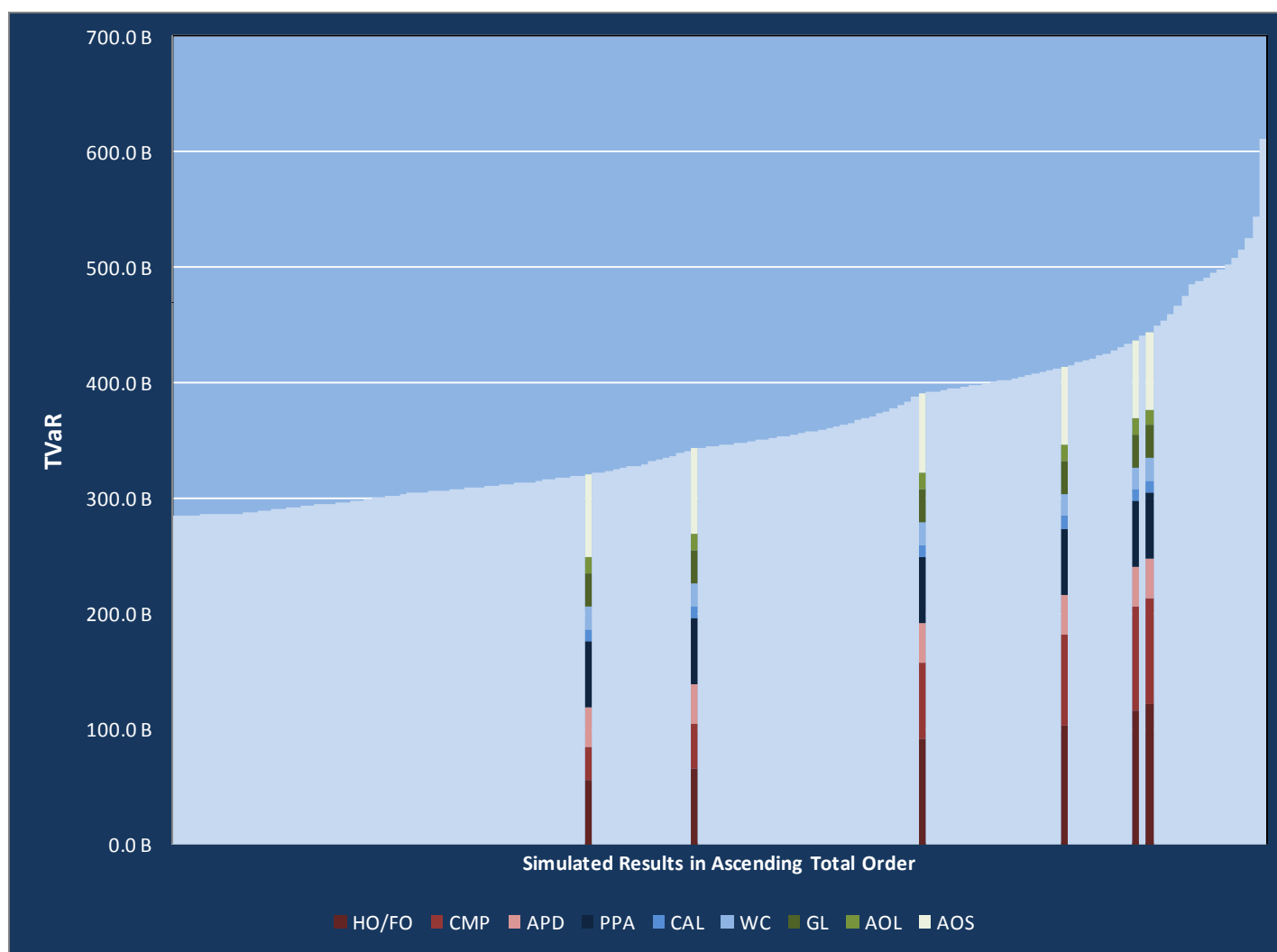
Line of Business	Return Period		Ave	Allocated Surplus
	4	200		
Non-Cat	89%	64%	77%	396.3
Hurricane	9%	32%	20%	104.5
Earthquake	2%	4%	3%	14.5
Total Cat	11%	36%	23%	119.0
Total TVaR	100%	100%	100%	515.3

- This chart summarizes the previous capital allocation indications by peril

Results and Implications

Visualizing the Gross TVaR Curve Industry

- Sort the total loss on each trial in ascending order.
- The average result past the nth-largest trial is TVaR.
- TVaR at zero is simply the average of all trials, \$285 B
- We've also captured the individual average results for LOBs at various return periods, (co-TVaRs).
- Choosing a return period for allocation is an expression of risk preferences.
- The higher the return period, the more capital is allocated to the cat-exposed lines (colored in shades of red, HO/FO, CMP, and APD).



Results and Implications

Statutory Mean Balance Sheet Industry

- The Mean Balance Sheet is constructed from the average result for each line item over all simulations.
- It implies an expected return on surplus of 4.8%
- In our model, reserves are projected to be somewhat reduced since we didn't assume any premium growth
- Invested assets are reallocated at the end of period according to the initial distribution.

Item	Year end 2010	Average Year End 2011
Bonds	792,908,411,901	804,923,469,190
Stocks	224,482,308,300	228,386,334,129
Cash	69,094,364,215	52,350,075,097
Other Invested Assets	116,230,033,642	116,221,415,368
Total Cash and Invested Assets	1,202,715,118,058	1,201,881,293,784
Other Assets	172,205,539,343	170,911,263,691
Total Assets	1,374,920,657,401	1,372,792,557,476

Net Loss and ALAE Reserves	531,310,214,000	486,319,486,661
Net Unearned Premium Reserves	180,132,945,166	198,009,593,149
Other Liabilities	142,336,306,969	142,336,306,969
Total Liabilities	853,779,466,135	826,665,386,779
Surplus Notes	13,756,464,104	13,756,464,104
Capital And Surplus	507,384,727,162	532,370,706,593
Policyholder Surplus	521,141,191,266	546,127,170,697
Total Liabilities & Policyholder Surplus	1,374,920,657,401	1,372,792,557,476

Results and Implications

Statutory Mean Income Statement Industry

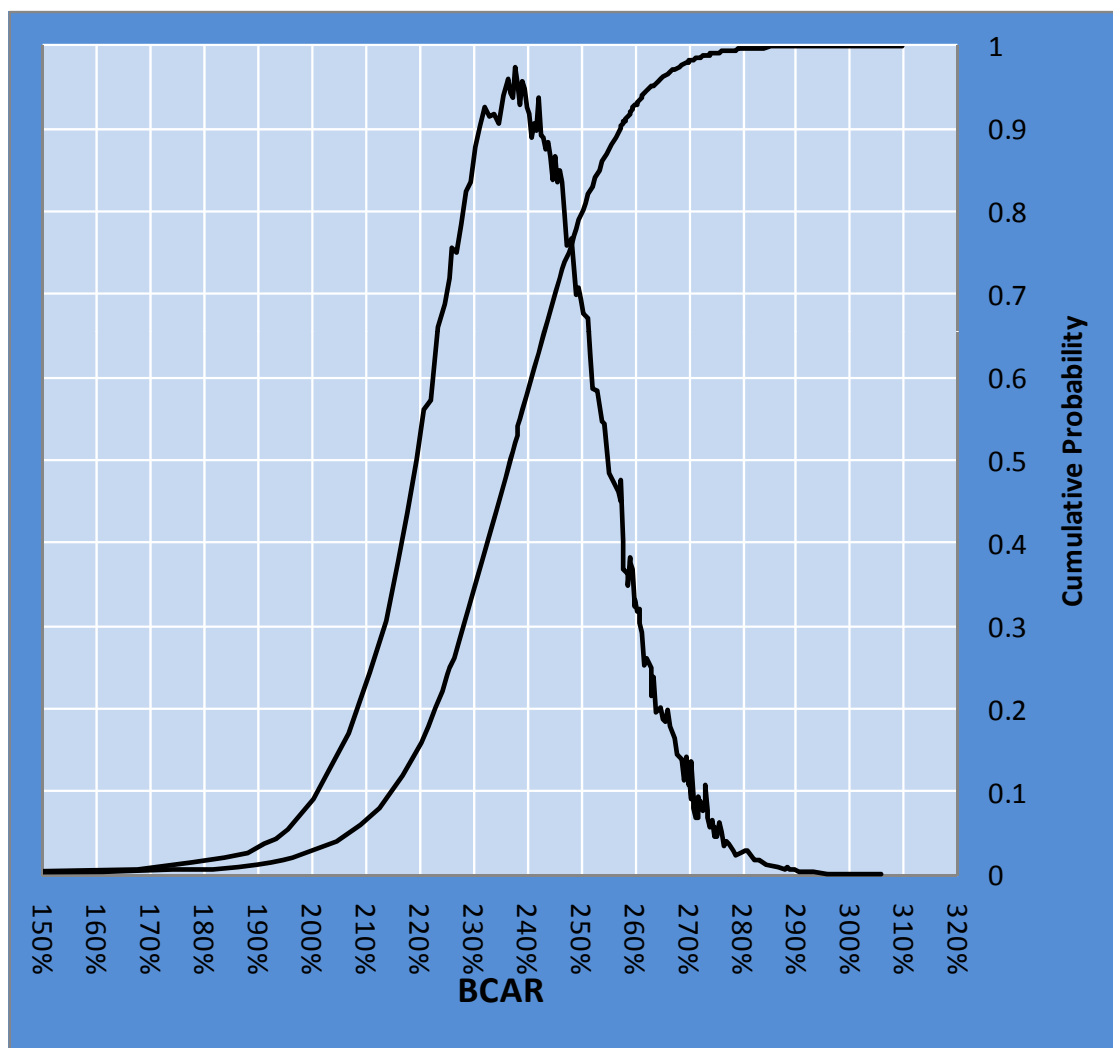
- The Mean Income Statement is constructed from the average result for each line item over all simulations.
- It implies an expected return on surplus of 4.8%
- Underwriting performance is projected to be unprofitable for the projected year

Item	Amount
Net Earned Premium	378,142,538,314
Net Incurred Loss	264,315,532,986
Net Underwriting Expenses	135,298,566,113
Underwriting Gain	(21,471,560,784)
Investment Income and Realized Capital Gains	50,476,932,211
Income Tax	6,558,669,217
Net Income	22,446,702,211
Change in Unrealized Capital Gains	3,413,747,353
Deferred Taxes	874,470,133
Change In Surplus	24,985,979,431

Results and Implications

BCAR Distribution Industry

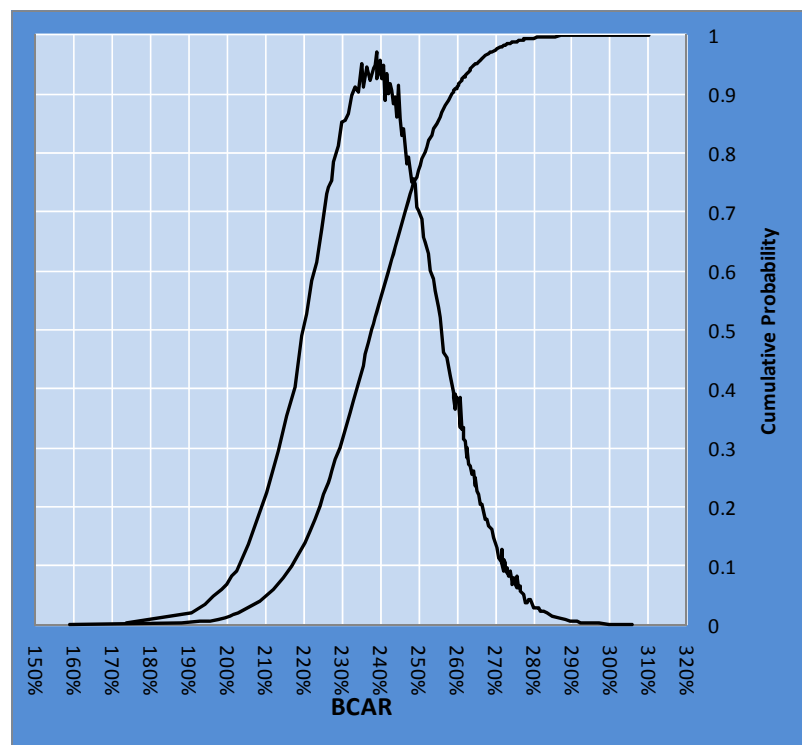
- Estimated BCAR for the end of the prospective period can be tabulated as any random variable
- Our model implies only a 0.5% chance of BCAR for the industry as-if enterprise to fall below 175%, the minimum requirement for an A++ rating
- The standard deviation of BCAR without reinsurance is 7.52% and improves to 6.85% with reinsurance.



Results and Implications

Statutory Model Overview Large National

- Expected BCAR is 238% with a 6.97% coefficient of variation
- The model implies a 4.4% return on surplus



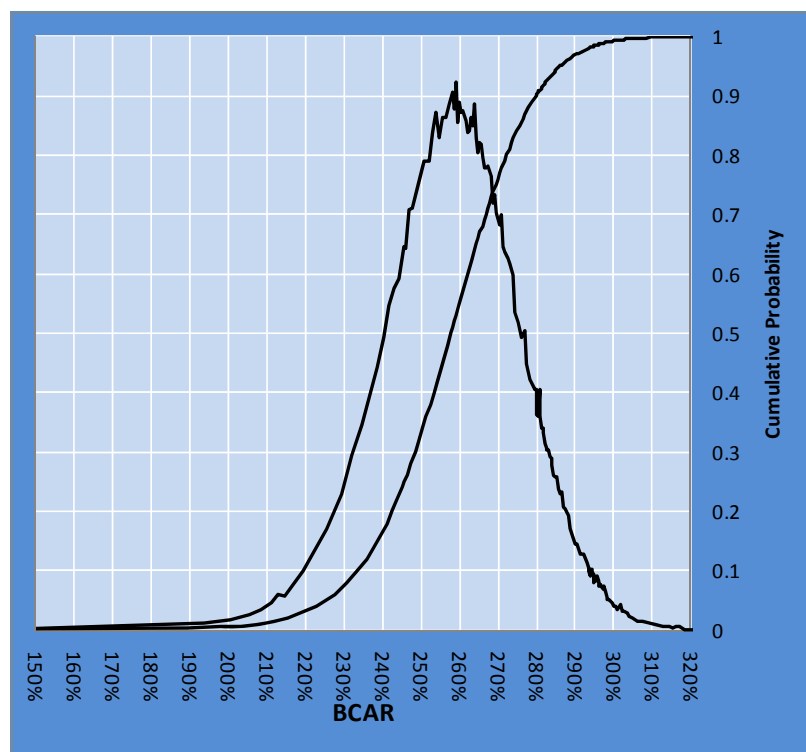
Item	Year end 2010	Average Year End 2011
Bonds	519,273,922,755	520,025,346,301
Stocks	181,102,408,080	186,569,330,514
Cash	45,984,364,622	44,343,108,355
Other Invested Assets	103,397,135,838	103,422,433,848
Total Cash and Invested Assets	849,757,831,295	854,360,219,019
Other Assets	116,336,274,795	116,507,939,302
Total Assets	966,094,106,090	970,868,158,321

Net Loss and ALAE Reserves	370,545,922,000	344,416,499,169
Net Unearned Premium Reserves	123,171,839,242	137,812,632,391
Other Liabilities	102,474,896,392	102,474,896,392
Total Liabilities	596,192,657,634	584,704,027,951
Surplus Notes	8,048,128,082	8,048,128,082
Capital And Surplus	361,853,320,374	378,116,002,288
Policyholder Surplus	369,901,448,456	386,164,130,370
Total Liabilities & Policyholder Surplus	966,094,106,090	970,868,158,321

Results and Implications

Statutory Model Overview Small Regional

- As a whole, the small regional segment has a stronger projected BCAR distribution (mean 257%) though slightly more volatile (7.27% coefficient of variation)
- The model implies a 14.6% return on surplus, driven in large part by stronger expected investment performance



Item	Year end 2010	Average Year End 2011
Bonds	84,189,730,801	93,548,339,738
Stocks	11,889,939,400	12,102,386,320
Cash	6,723,240,066	4,596,688,151
Other Invested Assets	2,848,724,253	2,848,725,316
Total Cash and Invested Assets	105,651,634,520	113,096,139,525
Other Assets	17,600,761,147	17,512,423,257
Total Assets	123,252,395,667	130,608,562,783

Net Loss and ALAE Reserves	45,354,293,000	46,255,009,625
Net Unearned Premium Reserves	19,606,703,859	19,244,404,581
Other Liabilities	11,741,955,383	11,741,955,383
Total Liabilities	76,702,952,242	77,241,369,589
Surplus Notes	1,395,328,032	1,395,328,032
Capital And Surplus	45,154,115,393	51,971,865,162
Policyholder Surplus	46,549,443,425	53,367,193,194
Total Liabilities & Policyholder Surplus	123,252,395,667	130,608,562,783

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Risk Model Output: The Scenario View

- We have ten realizations from a stochastic model for the overall business
- Sort the realizations in ascending order on total loss.
- The average total loss is the sum of the average loss for each segment.
- If we have zero aversion to risk, we could allocate capital to these lines of business based on the broken-out average.
- Equivalently, we are allocating capital based on the weighted average scenario, where the weights are each one.

Realization	Business Segment Losses			Total
	A	B	C	
1	498	595	-	1,093
2	241	1,718	104	2,064
3	2,125	684	226	3,035
4	417	97	2,546	3,061
5	535	3,742	-	4,278
6	6,978	122	93	7,193
7	158	143	11,788	12,089
8	19,027	98	-	19,125
9	1,476	192	29,386	31,053
10	508	1,689	76,494	78,691

Average	3,196	908	12,064	16,168
Percentage	20%	6%	75%	100%

VaR (Value-at-Risk) and Contribution Measures

- We may decide to assign the 'most-important' pain point a weight of one, and zero weight to all other realizations.

- That point would be called VaR (Value-At-Risk), in this case at the 90th percentile.

- The contributions to VaR from individual segments add up to the total VaR, because the realization is one complete scenario.

- The contributing average amounts are called co-VaR.

- The Risk Charge is the excess of the weighted average over the straight average.

- Co-VaR is generally an unstable measure for capital allocation.

Realization	Weight	Business Segment Losses			Total
		A	B	C	
1	0.0	498	595	-	1,093
2	0.0	241	1,718	104	2,064
3	0.0	2,125	684	226	3,035
4	0.0	417	97	2,546	3,061
5	0.0	535	3,742	-	4,278
6	0.0	6,978	122	93	7,193
7	0.0	158	143	11,788	12,089
8	0.0	19,027	98	-	19,125
9	1.0	1,476	192	29,386	31,053
10	0.0	508	1,689	76,494	78,691

Straight Ave	3,196	908	12,064	16,168
Wght Ave	1,476	192	29,386	31,053
Percentage	5%	1%	95%	100%
Risk Charge				14,885

Probability Transforms

An easy way to define smooth weights

- One way to define the weights is with a probability transform. The weights are defined by a curve *that effectively makes adverse realizations more likely.*

- The weights are a smooth way to recognize that the worst results are even more painful than the proportional size of their losses.

- Curve shape can be altered by changing parameter values, but only so much.

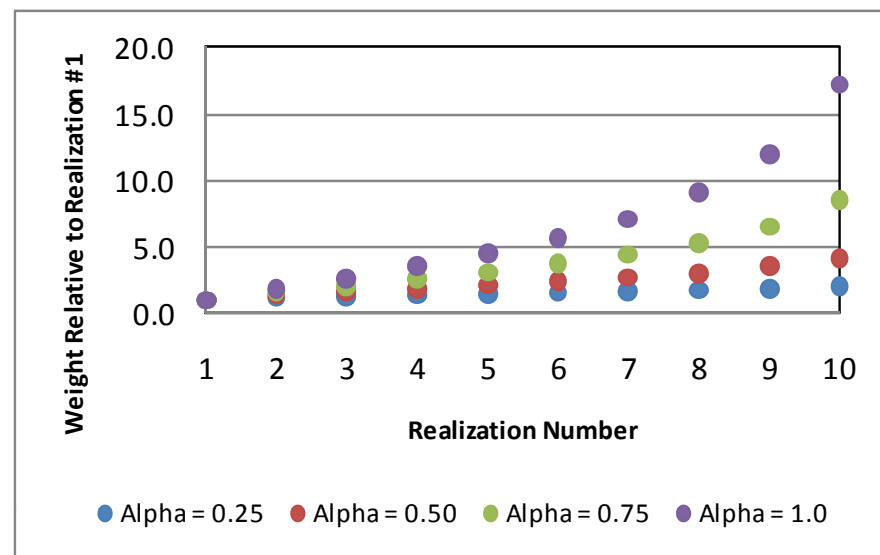
- In this example, we show a Wang transform. There are other curves.

Realization	Weight	Business Segment Losses			Total
		A	B	C	
1	1.0	498	595	-	1,093
2	1.9	241	1,718	104	2,064
3	2.7	2,125	684	226	3,035
4	3.7	417	97	2,546	3,061
5	4.8	535	3,742	-	4,278
6	6.1	6,978	122	93	7,193
7	8.0	158	143	11,788	12,089
8	10.7	19,027	98	-	19,125
9	15.4	1,476	192	29,386	31,053
10	34.6	508	1,689	76,494	78,691

Straight Ave	3,196	908	12,064	16,168
Wght Ave	3,353	993	36,050	40,397
% Allocation	8%	2%	89%	100%
	Risk Charge			24,228

Wang Transform Graphical View

- Increasing 'Alpha' in the Wang transform implies more pain for the increasingly adverse realizations.
- For example, if Alpha=1.0, Realization 10 is 34.6 times as painful as Realization 1 *per dollar*.
- Choosing alpha is arbitrary, but when the curve is viewed under the scenario view, management can clearly understand its effect.



Alpha:	0.25	0.50	0.75	1.00
Scenario	Weight	Weight	Weight	Weight
1	1.0	1.0	1.0	1.0
2	1.2	1.4	1.6	1.9
3	1.3	1.7	2.2	2.7
4	1.4	1.9	2.7	3.7
5	1.5	2.2	3.3	4.8
6	1.6	2.5	3.9	6.1
7	1.7	2.9	4.8	8.0
8	1.8	3.3	6.0	10.7
9	2.0	4.0	7.9	15.4
10	2.4	5.8	14.1	34.6

Utility Transforms

Another way to define weights using total loss

- Another family of weighting schemes defines the curve with formulas that depend on total loss, *in other words the pain-per-dollar is explicitly changing.*

- It's still just a way to calculate this realization weights.

- These weights are an Esscher transform with $h=.45$.

- The curve has a different shape than that of the Wang transform, but we chose $h=.45$ to provide the same risk loading overall.

Realization	Weight	Business Segment Losses			Total
		A	B	C	
1	1.0	498	595	-	1,093
2	1.0	241	1,718	104	2,064
3	1.1	2,125	684	226	3,035
4	1.1	417	97	2,546	3,061
5	1.1	535	3,742	-	4,278
6	1.2	6,978	122	93	7,193
7	1.4	158	143	11,788	12,089
8	1.7	19,027	98	-	19,125
9	2.3	1,476	192	29,386	31,053
10	8.7	508	1,689	76,494	78,691

Straight Ave	3,196	908	12,064	16,168
Wght Ave	2,537	1,120	36,739	40,397
% Allocation	6%	3%	91%	100%
			Risk Charge	24,228

Weighted TVaR Explanation of the Statistic

- $TVaR_{50}$ (Tail Value at Risk at the 50th Percentile) is the average total loss for all realizations larger than the 50th percentile.
- The arbitrary threshold of the 50th percentile is chosen to quantify risk preferences.
- $Co-TVaR_A$ is the average losses from business segment A over the same realizations. Note that these realizations are not in strict ascending order for segment A losses.

Business Segment Losses

Realization	A	B	C	Total
1	498	595	-	1,093
2	241	1,718	104	2,064
3	2,125	684	226	3,035
4	417	97	2,546	3,061
5	535	3,742	-	4,278
6	6,978	122	93	7,193
7	158	143	11,788	12,089
8	19,027	98	-	19,125
9	1,476	192	29,386	31,053
10	508	1,689	76,494	78,691

				$TVaR_{50}$
$Co-TVaR_{50}$	5,629	449	23,552	29,630
Percentage	19.0%	1.5%	79.5%	100.0%

TVaR Thresholds (Return Periods)

- If we chose the 80th percentile (i.e. 1 in 5 Return Period), the TVaR is larger.
- In this example, the tail risk is driven by Business Segment C. The allocation to C is more at the higher threshold.
- To allocate capital to support different levels of adverse loss events, we can weight the two TVaRs together. We will have to choose the weights.

Business Segment Losses

Realization	A	B	C	Total
1	498	595	-	1,093
2	241	1,718	104	2,064
3	2,125	684	226	3,035
4	417	97	2,546	3,061
5	535	3,742	-	4,278
6	6,978	122	93	7,193
7	158	143	11,788	12,089
8	19,027	98	-	19,125
9	1,476	192	29,386	31,053
10	508	1,689	76,494	78,691

TVaR₈₀

Co-TVaR ₈₀	992	940	52,940	54,872
Percentage	1.8%	1.7%	96.5%	100.0%

TVaR₅₀

Co-TVaR ₅₀	5,629	449	23,552	29,630
Percentage	19.0%	1.5%	79.5%	100.0%

TVaR Weighting

- Let's assign a weight of 43% to Co-TVaR₈₀ and 57% to Co-TVaR₅₀. The resulting weighted total TVaR is 40,397, producing the the same risk charge as in the previous examples.

Weight		A	B	C	Total
0.43	Co-TVaR ₈₀	992	940	52,940	54,872
	Percentage	1.8%	1.7%	96.5%	100.0%
0.57	Co-TVaR ₅₀	5,629	449	23,552	29,630
	Percentage	19.0%	1.5%	79.5%	100.0%
Weighted Total	Co-TVaR _{Wgt}	3,651	658	36,087	40,397
	Percentage	9.0%	1.6%	89.3%	100.0%

Weighted TVaR Under the Scenario View

- By using two TVaR measures we describe our preferences between different 'zones' of the loss distribution.

- The preferences 1 and 2.9 over the two zones can be directly calculated from the 43%/57% weights and the thresholds of 50th and 80th percentile.

- The realization weights are a step function. Each step (there can be more than two) occurs at an important capital management point, (e.g. earnings miss, single downgrade, solvency impairment).

Realization	Weight	Business Segment Losses			Total
		A	B	C	
1	0.0	498	595	-	1,093
2	0.0	241	1,718	104	2,064
3	0.0	2,125	684	226	3,035
4	0.0	417	97	2,546	3,061
5	0.0	535	3,742	-	4,278
6	1.0	6,978	122	93	7,193
7	1.0	158	143	11,788	12,089
8	1.0	19,027	98	-	19,125
9	2.9	1,476	192	29,386	31,053
10	2.9	508	1,689	76,494	78,691

Straight Ave	3,196	908	12,064	16,168
Wght Ave	3,651	658	36,087	40,397
% Allocation	9%	2%	89%	100%
			Risk Charge	24,229

Summary of What We Have Done

- We have allocated Risk Charge to individual business segments using multiple approaches which can often be non-transparent.
- We have done so under the scenario view, making the difference in risk preferences clear between the approaches.
- The risk preference curve affords management the understanding of which realizations are driving allocation decisions. Defining different pain points on the sorted realization tally is straightforward.

Weighting	<u>Business Segment Allocation</u>			Weighted Average	Risk Charge
	A	B	C		
Straight Average	20%	6%	75%	16,168	-
VaR ₉₀	5%	1%	95%	31,053	14,885
Wang (Lambda = 1.0)	8%	2%	89%	40,397	24,228
Esscher (h=0.45)	6%	3%	91%	40,397	24,228
TVaR ₅₀ (43%) and TVaR ₈₀ (57%)	9%	2%	89%	40,397	24,228

Key Concepts

- Allocation of risk charge can be viewed in the common framework of the Scenario View, where a weight is assigned to each realization and co-measures are computed as weighted averages.
- Probability transforms make adverse realizations effectively more likely by assigning larger weights to these realizations.
- Utility transforms stipulate that the pain-per-dollar increases with increasingly adverse realizations, and calculate a curve which is also expressed as set of weights over realizations.
- In principle, the risk manager could define any set of weights across the realizations. We call the weights the Risk Preference Function.
- Weighting Co-TVaR at different thresholds together creates a step function comparable to the smoother curves. This approach to the Risk Preference Design has the following strengths:
 - Ease of calculation, explanation, and interpretation
 - Reliance on a common metric in risk management (TVaR)
 - Compatibility with prevalent practice of defining zones of operating loss impact: missing earnings, losing enough to warrant a downgrade, destruction of solvency.

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Some Observations from the Models

- The industry is well capitalized, as measured by BCAR and via full economic capital modeling.
- The threats to equity posed by asset risk and insurance risk are comparable, with asset risk slight larger. The largest source of insurance risk over a one-year horizon is natural catastrophe risk.
- Reinsurance significantly insulates the industry from extreme events and makes HO/FO and CMP (particularly CMP) more palatable.
- Allocation of capital according to our method (50/50 weighting of 1-in-4 TVaR and 1-in-200 TVaR) implies about a quarter of industry capital dedicated toward natural catastrophe risk. This amount of course depends on risk preferences.
- The industry is presently in a difficult underwriting environment.
- The Small Regional segment as a whole seems slightly better capitalized than the Large National segment, but possesses slightly more volatility.



Appendix

Full Fixed Income Asset Profile – Industry Total Government and Municipals

Bond Type	Bond Quality	Market Value	Amortized Cost	Average Time To Maturity	Embedded Coupon Rate	Average Duration
Government	AAA	6,455,331,264	6,296,805,110	1	0.02581	0.50
Government	AAA	8,045,997,585	7,848,408,800	3	0.02581	2.43
Government	AAA	3,604,068,943	3,515,562,379	8	0.02581	6.83
Government	AAA	1,842,019,834	1,796,784,615	15	0.02581	12.13
Government	AAA	813,086,580	793,119,287	25	0.02581	18.23
Municipal	AAA	31,802,347,299	31,012,128,500	1	0.01274	0.50
Municipal	AAA	149,498,982,932	145,784,260,062	3	0.01274	2.46
Municipal	AAA	114,602,786,822	111,755,158,130	8	0.01274	7.16
Municipal	AAA	71,642,684,833	69,862,520,750	15	0.01274	13.25
Municipal	AAA	28,091,633,032	27,393,617,369	25	0.01274	21.07
Municipal	AA	610,606,501	595,434,265	1	0.01274	0.50
Municipal	AA	3,909,461,521	3,812,319,950	3	0.01274	2.46
Municipal	AA	2,731,166,906	2,663,303,380	8	0.01274	7.16
Municipal	AA	3,004,024,405	2,929,380,967	15	0.01274	13.25
Municipal	AA	1,489,289,857	1,452,284,260	25	0.01274	21.07
Municipal	A	40,082,082	39,086,130	1	0.01274	0.50
Municipal	A	137,780,553	134,357,007	3	0.01274	2.46
Municipal	A	242,466,231	236,441,475	8	0.01274	7.16
Municipal	A	207,742,548	202,580,600	15	0.01274	13.25
Municipal	A	391,641,548	381,910,112	25	0.01274	21.07
Municipal	BBB	854,521	833,288	1	0.01274	0.50
Municipal	BBB	37,357,174	36,428,929	3	0.01274	2.46
Municipal	BBB	45,932,607	44,791,282	8	0.01274	7.16
Municipal	BBB	76,223,791	74,329,796	15	0.01274	13.25
Municipal	BBB	41,141,320	40,119,048	25	0.01274	21.07
Municipal	BB	79,637,810	77,658,984	1	0.01274	0.50
Municipal	BB	157,099,467	153,195,889	3	0.01274	2.46
Municipal	BB	82,290,260	80,245,527	8	0.01274	7.16
Municipal	BB	107,503,762	104,832,529	15	0.01274	13.25
Municipal	BB	87,300,730	85,131,497	25	0.01274	21.07
Municipal	B	8,675,012	8,459,457	1	0.01274	0.50
Municipal	B	34,714,968	33,852,377	3	0.01274	2.46
Municipal	B	44,748,139	43,636,246	8	0.01274	7.16
Municipal	B	54,247,132	52,899,209	15	0.01274	13.25
Municipal	B	21,214,887	20,687,744	25	0.01274	21.07

Full Fixed Income Asset Profile – Industry Total Corporate Bonds

Bond Type	Bond Quality	Market Value	Amortized Cost	Average Time To Maturity	Embedded Coupon Rate	Average Duration
Corporate	AAA	56,998,811,268	54,583,536,469	1	0.06595	0.50
Corporate	AAA	120,245,839,406	115,150,527,081	3	0.06595	2.32
Corporate	AAA	62,497,353,862	59,849,083,128	8	0.06595	5.97
Corporate	AAA	8,066,256,302	7,724,455,743	15	0.06595	9.46
Corporate	AAA	12,963,259,389	12,413,952,605	25	0.06595	12.39
Corporate	AA	16,108,529,302	15,425,944,455	1	0.06595	0.50
Corporate	AA	36,262,980,123	34,726,368,042	3	0.06595	2.32
Corporate	AA	33,815,516,211	32,382,613,273	8	0.06595	5.97
Corporate	AA	4,476,903,593	4,287,198,717	15	0.06595	9.46
Corporate	AA	6,259,674,554	5,994,426,317	25	0.06595	12.39
Corporate	A	764,070,797	731,693,965	1	0.06595	0.50
Corporate	A	4,775,871,914	4,573,498,516	3	0.06595	2.32
Corporate	A	5,756,480,082	5,512,554,271	8	0.06595	5.97
Corporate	A	620,362,916	594,075,579	15	0.06595	9.46
Corporate	A	1,683,370,509	1,612,039,155	25	0.06595	12.39
Corporate	BBB	483,023,691	462,555,984	1	0.06595	0.50
Corporate	BBB	3,713,975,997	3,556,599,511	3	0.06595	2.32
Corporate	BBB	9,488,514,824	9,086,447,303	8	0.06595	5.97
Corporate	BBB	507,017,668	485,533,238	15	0.06595	9.46
Corporate	BBB	138,867,904	132,983,498	25	0.06595	12.39
Corporate	BB	282,555,759	270,582,706	1	0.06595	0.50
Corporate	BB	1,856,610,979	1,777,938,712	3	0.06595	2.32
Corporate	BB	812,805,801	778,363,866	8	0.06595	5.97
Corporate	BB	217,993,690	208,756,398	15	0.06595	9.46
Corporate	BB	89,598,089	85,801,448	25	0.06595	12.39
Corporate	B	118,855,324	113,818,934	1	0.06595	0.50
Corporate	B	422,546,049	404,641,030	3	0.06595	2.32
Corporate	B	400,693,568	383,714,528	8	0.06595	5.97
Corporate	B	44,144,783	42,274,186	15	0.06595	9.46
Corporate	B	202,446,802	193,868,295	25	0.06595	12.39

Industry Total Composition (291 NAIC Combined Groups)

AAA Mid-Atlantic Insurance Group (Combined)	Central Mutual of Ohio Group (Combined)	Geovera Holdings, Inc. Group (Combined)	Munich Reinsurance America, Inc. (Combined)	SCF Arizona (Combined)
Acceptance Indemnity Insurance Company (Combined)	Cincinnati Equitable Insurance Cos (Combined)	Germania Mutual Group (Combined)	Mutual Benefit Ins. Co. (Combined)	SCOR Reinsurance Company Group (Combined)
Accident Fund Insurance Company of America (Combined)	Cincinnati Insurance Group (Combined)	Global Indemnity Group, Inc. (Combined)	Narragansett Bay Insurance Company Group (Combined)	SECURA Insurance Companies (Combined)
ACE American Insurance Company (Combined)	Civil Svc Employees & CSE Safeguard (Combined)	Global Re Corporation of America (Combined)	National Group (Combined)	Selective Insurance Company of America (Combined)
Affirmative Insurance Company (Combined)	Clarendon National Insurance (Combined)	Grange Insurance Association (Combined)	National Guaranty Insurance Company (Combined)	Sentry Insurance a Mutual Company (Combined)
Alfa Mutual Insurance Company (Combined)	CMG Mortgage Insurance Company (Combined)	Grange Mutual Cas Co (Combined)	National Indemnity Company (Combined)	Sequoia Insurance Company (Combined)
Alleghany Insurance Holdings, LLC (Combined)	CNA Surety Corporation (Combined)	Gray Insurance Company (Combined)	National Security Fire & Gas Company (Combined)	Shelter Mutual Insurance Company (Combined)
Allianz Global Risks US Ins Company (Combined)	Coliseum Reinsurance Company (Combined)	Greater New York Mutual Insurance Company (Combined)	Nationwide Mutual Insurance Company (Combined)	Sompo Japan Insurance Company of America (Combined)
Allied World Assurance Holdings Group (Combined)	Columbia Mutual Insurance Company (Combined)	Grinnell Mutual Group (Combined)	Navigators Insurance Company (Combined)	Southern Farm Bureau Cas Consolidated (Combined)
Allstate Insurance Group (Combined)	Commerce Insurance Company (Combined)	GuideOne Mutl & GuideOne Spclty Mutl (Combined)	NC Farm Bureau Insurance Group (Combined)	Southern General Financial Group (Combined)
Alterra Capital Group (Combined)	Concord General Mutual Insurance Co (Combined)	Hanover Insurance Company (Combined)	NCMIC Insurance Company (Combined)	SPARTA Insurance Company (Combined)
Ambac Assurance Corporation (Combined)	Consolidated Lloyds (Combined)	HANYS Member Hosps Self-Ins Trust (Combined)	New Jersey Manufacturers Ins Company (Combined)	Star Insurance Company (Combined)
Amerco Corporation (Combined)	Continental Casualty Company (Combined)	Harleysville Mutual Insurance Company (Combined)	New Jersey Skylands Insurance Association (Combined)	State Auto Group (Combined)
American Contractors Insurance Group (Combined)	Cooperativa de Seguros Multiples de PR (Combined)	Hartford Fire Insurance Company (Combined)	New London County Mutual Ins Company (Combined)	State Farm Mutual Automobile Ins Co (Combined)
American European Insurance Group (Combined)	COUNTRY Mutual Insurance Company (Combined)	HCC Insurance Holdings Group (Combined)	New Mexico Mutual Group (Combined)	State National Insurance Company, Inc. (Combined)
American Family Mutual Ins Company (Combined)	Crum & Forster Insurance Companies (Combined)	Highmark Cas Ins Co. & HM Cas Ins Co. (Combined)	New York Central Mutual Fire Insurance Company (Combined)	Swiss Reinsurance America Corporation (Combined)
American Financial Group, Inc. (Combined)	Cumberland Insurance Group (Combined)	Hiscox Insurance Company Inc. (Combined)	New York Marine and General Ins Co (Combined)	Technology Insurance Company, Inc. (Combined)
American Hallmark Ins Co of TX (Combined)	CUMIS Insurance Society, Inc. (Combined)	Hochheim Prairie Insurance Group (Combined)	NGM Insurance Company (Combined)	Tennessee Farmers Mutual Insurance Company (Combined)
American Independent Companies, Inc. (Combined)	Dakota Group (Combined)	Homesite Insurance Group (Combined)	NORCAL Mutual Insurance Company (Combined)	TIG Insurance Company (Combined)
American International Group, Inc. (Combined)	De Smet Farm Mutl Ins Co of SD (Combined)	Horace Mann Insurance Company (Combined)	Norfolk & Dedham Group (Combined)	Tokio Marine Holdings, Inc. (Combined)
American Mercury Insurance Co. (Combined)	Developers Surety and Indemnity Company (Combined)	Houston General Insurance Exchange (Combined)	North Star Companies Group (Combined)	Topa Insurance Company (Combined)
American Mutual Share Insurance Corporation (Combined)	Direct General Group (Combined)	Houston International Insurance Group (Combined)	Ohio Farmers Ins. Co. (Combined)	Tower Hill Preferred & Omega Insurance Company (Combined)
American National P&C Company (Combined)	Doctors Co, An Interinsurance Exchange (Combined)	IDS Property Casualty Insurance Company (Combined)	Ohio Mutual Insurance Group (Combined)	Tower Hill Prime & Tower Hill Select (Combined)
American Safety Casualty Ins Company (Combined)	Donegal Mutual Insurance Company (Combined)	IMT Mutual Holding Group (Combined)	Oklahoma Farm Bureau Insurance Group (Combined)	Tower Insurance Company of New York (Combined)
AMERISAFE Group (Combined)	DTRIC Insurance Co., Ltd. (Combined)	Infinity P&C Insurance Group (Combined)	Old Republic General Insurance Group - U.S. (Combined)	Transatlantic Holdings Inc (Combined)
Amerisure Mutual Insurance Company (Combined)	Eastern Alliance Insurance Group (Combined)	Insurance Company of the West (Combined)	OneBeacon Insurance Group (Combined)	Travelers Companies, Inc. (Combined)
AmGUARD NorGUARD EastGUARD & WestGUARD (Combined)	Employers Holdings Inc. (Combined)	Integon National Insurance Company (Combined)	Oregon Mutual Insurance Company (Combined)	Triad Guaranty Insurance Company (Combined)
Amica Mutual Insurance Company (Combined)	Employers Mutual Casualty Company (Combined)	Island Insurance Companies (Combined)	Pacific Specialty Ins Co./Pacific Specialty P&C Co. (Combined)	Ulico Property and Casualty Group (Combined)
Apollo Casualty Company (Combined)	Endurance Group (Combined)	ISMIE Insurance Group (Combined)	Palisades Safety and Insurance Association (Combined)	Union Mutual of Vermont Companies (Combined)
Arbella Insurance Group (Combined)	Enumclaw Insurance Group (Combined)	James River Insurance Group (Combined)	Norfolk & Dedham Group of the U.S. (Combined)	United Automobile Insurance Group (Combined)
Arch Capital Group (U.S.) Inc. (Combined)	Erie Insurance Group (Combined)	Kentucky Farm Bureau Mutl Ins Co (Combined)	PENCO Insurance Companies (Combined)	United Farm Family Mutual Ins Company (Combined)
Argo Group US, Inc. (Combined)	Esurance Insurance Company (Combined)	KnightBrook Ins Co Guilderland Re Co (Combined)	Penn Millers Insurance Company (Combined)	United Fire & Casualty Company (Combined)
ARI Mutual Insurance Company (Combined)	Everest Reinsurance Company (Combined)	Lackawanna Casualty Company (Combined)	Penn National Insurance (Combined)	United Services Automobile Association (Combined)
Arrowood Indemnity Company (Combined)	Evergreen National Indemnity Company (Combined)	Lancer Insurance Group (Combined)	Philadelphia Contributionship (Combined)	Unitrin P&C Insurance Group (Combined)
ARX Holding Corp (Combined)	Factory Mutual Insurance Company (Combined)	Liberty Mutual Insurance Company (Combined)	Philadelphia Indemnity Ins Company (Combined)	Universal Insurance Holdings of North America (Combined)
Aspen American Ins Co. & Aspen Specialty Ins Co. (Combined)	Farm Bureau Mutual Insurance Co of MI (Combined)	Loya Insurance Company (Combined)	Physicians Insurance A Mutual Group (Combined)	Universal Surety Co & Inland Ins Co. (Combined)
Assod Industries of MA Mutl Ins Co (Combined)	Farm Bureau Mutual Insurance Company (Combined)	Lumbermens Mutual Casualty Company (Combined)	Plymouth Rock Assurance Corporation (Combined)	USF Insurance Company (Combined)
Assurant Group (Combined)	Farm Bureau Mutual Insurance Company of Idaho (Combined)	MAG Mutual Group (Combined)	PMI Mortgage Insurance Co. (Combined)	Utica Mutual Insurance Company (Combined)
Assured Guaranty Municipal Corp. (Combined)	Farmers Alliance Mutual Insurance Co (Combined)	Maiden Reinsurance Company (Combined)	ProAssurance Group of Companies (Combined)	Vermont Mutual Insurance Group (Combined)
Atlantic Casualty Insurance Company (Combined)	Farmers and Mechanics Mutual Group (Combined)	Maine Employers' Mutual Ins Group (Combined)	Producers Agriculture Insurance Company (Combined)	VFH Captive Insurance Company (Combined)
Atlantic Charter Insurance Company (Combined)	Farmers Auto Ins Assn & Auto Mgmt Corp (Combined)	MAPFRE PRAICO Corporation (Combined)	Progressive Insurance Group (Combined)	Virginia Farm Bureau Mutual Ins Co (Combined)
Auto Club Enterprises Insurance Group (Combined)	Farmers Insurance Group of Companies (Combined)	Markel and Affiliates (Combined)	ProMutual Group (Combined)	W.R. Berkley Corporation (Combined)
Auto Club Insurance Association (Combined)	Farmers Mutl Hail Ins Co of Iowa Group (Combined)	Maxum Specialty Insurance Group (Combined)	Protective Insurance Company (Combined)	Wawanesa Insurance Group (Combined)
Auto-Owners Insurance Company (Combined)	FCI Insurance Group (Combined)	Medical Insurance Group (Combined)	Providence Group (Combined)	Western Mutual Insurance Group (Combined)
AXIS Specialty Insurance Company (Combined)	Federal Insurance Company (Combined)	Medical Liability Mutual Insurance Company (Combined)	Providence Washington Ins Company (Combined)	Western National Insurance Group (Combined)
Balboa Insurance Company (Combined)	Federated Mutual Group (Combined)	Medical Mutual Group (Combined)	Public Service Mutual Insurance Company (Combined)	Western Reserve Mutual Casualty Company (Combined)
Bankers Insurance Company (Combined)	Fidelity National Insurance Co. (Combined)	Medmarc Insurance Group (Combined)	PURE Group of Insurance Companies (Combined)	Western World Insurance Company (Combined)
Bar Plan Group (Combined)	Fire Districts NY Group (Combined)	Mendota Insurance Company (Combined)	QBE the Americas (Combined)	Wisconsin County Mutual Group (Combined)
Barnstable Group (Combined)	Fireman's Fund Insurance Companies (Combined)	Mercer Insurance Group (Combined)	Quanta Indemnity Company (Combined)	XL Reinsurance America Inc. (Combined)
Beacon Mutual Insurance Group (Combined)	First Acceptance Ins Company, Inc. (Combined)	Merchants Mutual Insurance Company (Combined)	Quincy Mutual Group (Combined)	Zenith Insurance Company (Combined)
Bond Safeguard Ins Co. & Lexon Ins Co. (Combined)	First Financial Insurance Company (Combined)	Mercury Casualty Company (Combined)	Radian Guaranty Inc. (Combined)	Zurich American Insurance Company (Combined)
Buckeye Insurance Group (Combined)	First Professionals Insurance Company, Inc. (Combined)	Merrimack Mutual Fire Ins Company (Combined)	Red Shield Insurance Company (Combined)	
Builders Insurance (A Mutual Captive) (Combined)	First State Insurance Group (Combined)	Metropolitan P&C Insurance Company (Combined)	ReliaMax Insurance Company (Combined)	
Builders Mutual Insurance Company (Combined)	Flexpoint Fund Group (Combined)	Middle Georgia Group (Combined)	RenRe North America Insurance Holdings Group (Combined)	
CA State Auto Assn Inter-Ins Bureau (Combined)	Florida Family Insurance Company (Combined)	Millers First Insurance Company (Combined)	Republic Companies, Inc. (Combined)	
California Capital Insurance Company (Combined)	Florists' Mutual Insurance Company (Combined)	Mitsui Sumitomo Insurance Group (Combined)	Republic Mortgage Insurance Company (Combined)	
California Casualty Indemnity Exchange (Combined)	Frankenmuth Insurance (Combined)	Mortgage Guaranty Ins Corporation (Combined)	RLI Insurance Company Group (Combined)	
Cameron Insurance Companies (Combined)	Franklin Homeowners (Combined)	Motorists Insurance Group (Combined)	Rockingham Mutual Insurance Company (Combined)	
Canal Insurance Company (Combined)	Franklin Mutual Group (Combined)	Motors Insurance Corporation (Combined)	Safety Insurance Company (Combined)	
Celina Mutual Group (Combined)	Genworth Mortgage Ins Corporation (Combined)	Mountain States Insurance Group (Combined)	Safeway Insurance Company (Combined)	

Large National Composition (35 NAIC Combined Groups)

ACE American Insurance Company (Combined)
Alleghany Insurance Holdings, LLC (Combined)
Allianz Global Risks US Ins Company (Combined)
Allstate Insurance Group (Combined)
American Financial Group, Inc. (Combined)
American International Group, Inc. (Combined)
Arch Capital Group (U.S.) Inc. (Combined)
Arrowood Indemnity Company (Combined)
Assurant Group (Combined)
CNA Surety Corporation (Combined)
Continental Casualty Company (Combined)
Factory Mutual Insurance Company (Combined)
Farmers Insurance Group of Companies (Combined)
Federal Insurance Company (Combined)
Fireman's Fund Insurance Companies (Combined)
First State Insurance Group (Combined)
Hanover Insurance Company (Combined)
Hartford Fire Insurance Company (Combined)
HCC Insurance Holdings Group (Combined)
Liberty Mutual Insurance Company (Combined)
Markel and Affiliates (Combined)
National Indemnity Company (Combined)
Nationwide Mutual Insurance Company (Combined)
OneBeacon Insurance Group (Combined)
Philadelphia Indemnity Ins Company (Combined)
Progressive Insurance Group (Combined)
QBE the Americas (Combined)
State Farm Mutual Automobile Ins Co (Combined)
TIG Insurance Company (Combined)
Tokio Marine Holdings, Inc. (Combined)
Travelers Companies, Inc. (Combined)
United Services Automobile Association (Combined)
W.R. Berkley Corporation (Combined)
Zenith Insurance Company (Combined)
Zurich American Insurance Company (Combined)

Small Regional Composition (157 NAIC Combined Groups)

Accident Fund Insurance Company of America (Combined)
Aegis Security Insurance & American Sentinel Insurance Cos. (Combined)
Affirmative Insurance Company (Combined)
Alfa Mutual Insurance Company (Combined)
American Contractors Insurance Group (Combined)
American European Insurance Group (Combined)
American Hallmark Ins Co of TX (Combined)
American Independent Companies, Inc. (Combined)
American Mutual Share Insurance Corporation (Combined)
AMERISAFE Group (Combined)
Amerisure Mutual Insurance Company (Combined)
AmGUARD NorGUARD EastGUARD & WestGUARD (Combined)
Apollo Casualty Company (Combined)
Arbella Insurance Group (Combined)
Argo Group US, Inc. (Combined)
ARI Mutual Insurance Company (Combined)
ARX Holding Corp (Combined)
Assoc Industries of MA Mutl Ins Co (Combined)
Assured Guaranty Municipal Corp. (Combined)
Atlantic Charter Insurance Company (Combined)
Bankers Insurance Company (Combined)
Bar Plan Group (Combined)
Barnstable Group (Combined)
Beacon Mutual Insurance Group (Combined)
Buckeye Insurance Group (Combined)
Builders Insurance (A Mutual Captive) (Combined)
California Capital Insurance Company (Combined)
California Casualty Indemnity Exchange (Combined)
Cameron Insurance Companies (Combined)
Celina Mutual Group (Combined)
Central Mutual of Ohio Group (Combined)
Cincinnati Equitable Insurance Cos (Combined)
Civil Svc Employees & CSE Safeguard (Combined)
CMG Mortgage Insurance Company (Combined)
Columbia Mutual Insurance Company (Combined)
Concord General Mutual Insurance Co (Combined)
Cumberland Insurance Group (Combined)
CUMIS Insurance Society, Inc. (Combined)
Dakota Group (Combined)
Developers Surety and Indemnity Company (Combined)
Direct General Group (Combined)
Doctors Co, An Interinsurance Exchange (Combined)
Donegal Mutual Insurance Company (Combined)
Eastern Alliance Insurance Group (Combined)
Employers Holdings Inc. (Combined)
Endurance Group (Combined)
Enumclaw Insurance Group (Combined)
Esurance Insurance Company (Combined)
Evergreen National Indemnity Company (Combined)
Farm Bureau Mutual Insurance Co of MI (Combined)
Farm Bureau Mutual Insurance Company (Combined)
Farm Bureau Mutual Insurance Company of Idaho (Combined)
Farmers Alliance Mutual Insurance Co (Combined)
Farmers and Mechanics Mutual Group (Combined)
Farmers Auto Ins Assn & Auto Mgmt Corp (Combined)
Farmers Mutl Hail Ins Co of Iowa Group (Combined)
FCCI Insurance Group (Combined)
Federated Mutual Group (Combined)
Fidelity National Insurance Co. (Combined)
First Acceptance Ins Company, Inc. (Combined)
First Professionals Insurance Company, Inc. (Combined)
Florists' Mutual Insurance Company (Combined)
Frankenmuth Insurance (Combined)
Franklin Homeowners (Combined)
Franklin Mutual Group (Combined)
Geovera Holdings, Inc. Group (Combined)
Germania Mutual Group (Combined)
Grange Insurance Association (Combined)
Gray Insurance Company (Combined)
Greater New York Mutual Insurance Company (Combined)
Grinnell Mutual Group (Combined)
GuideOne Mutl & GuideOne Spclty Mutl (Combined)
HANY Member Hosps Self-Ins Trust (Combined)
Hochheim Prairie Insurance Group (Combined)
Homesite Insurance Group (Combined)
Horace Mann Insurance Company (Combined)
Houston General Insurance Exchange (Combined)
IDS Property Casualty Insurance Company (Combined)
ILM Group (Combined)
Infinity P&C Insurance Group (Combined)
Island Insurance Companies (Combined)
ISMIE Insurance Group (Combined)
Kentucky Farm Bureau Mutl Ins Co (Combined)
Lackawanna Casualty Company (Combined)
Loya Insurance Company (Combined)
MAG Mutual Group (Combined)
Maine Employers' Mutual Ins Group (Combined)
MAPFRE PRAICO Corporation (Combined)
Medical Insurance Group (Combined)
Medical Liability Mutual Insurance Company (Combined)
Medical Mutual Group (Combined)
Mercer Insurance Group (Combined)
Merchants Mutual Insurance Company (Combined)
Merrimack Mutual Fire Ins Company (Combined)
Middle Georgia Group (Combined)
Millers First Insurance Company (Combined)
Mitsui Sumitomo Insurance Group (Combined)
Motorists Insurance Group (Combined)
Mountain States Insurance Group (Combined)
Mutual Benefit Ins. Co. (Combined)
Narragansett Bay Insurance Company Group (Combined)
National American Insurance Company of California (Combined)
National Group (Combined)
National Security Fire & Cas Company (Combined)
NC Farm Bureau Insurance Group (Combined)
NCMIC Insurance Company (Combined)
New London County Mutual Ins Company (Combined)
New Mexico Mutual Group (Combined)
New York Central Mutual Fire Insurance Company (Combined)
NGM Insurance Company (Combined)
NORCAL Mutual Insurance Company (Combined)
Norfolk & Dedham Group (Combined)
North Star Companies Group (Combined)
Oklahoma Farm Bureau Insurance Group (Combined)
Oregon Mutual Insurance Company (Combined)
PEMCO Insurance Companies (Combined)
Penn Millers Insurance Company (Combined)
Penn National Insurance (Combined)
Philadelphia Contributionship (Combined)
Physicians Insurance A Mutual Group (Combined)
ProAssurance Group of Companies (Combined)
ProMutual Group (Combined)
Providence Group (Combined)
Public Service Mutual Insurance Company (Combined)
Quincy Mutual Group (Combined)
Red Shield Insurance Company (Combined)
ReliaMax Insurance Company (Combined)
RenRe North America Insurance Holdings Group (Combined)
Republic Companies, Inc. (Combined)
RLI Insurance Company Group (Combined)
Rockingham Mutual Insurance Company (Combined)
Safety Insurance Company (Combined)
SECURA Insurance Companies (Combined)
Sequoia Insurance Company (Combined)
Sompo Japan Insurance Company of America (Combined)
South Carolina Farm Bureau Mutual Insurance Company (Combined)
Southern General Financial Group (Combined)
State National Insurance Company, Inc. (Combined)
Tennessee Farmers Mutual Insurance Company (Combined)
Topa Insurance Company (Combined)
Ullico Property and Casualty Group (Combined)
United Automobile Insurance Group (Combined)
United Farm Family Mutual Ins Company (Combined)
United Fire & Casualty Company (Combined)
Universal Surety Co & Inland Ins Co. (Combined)
USF Insurance Company (Combined)
Utica Mutual Insurance Company (Combined)
Vermont Mutual Insurance Group (Combined)
VFH Captive Insurance Company (Combined)
Virginia Farm Bureau Mutual Ins Co (Combined)
Wawanesa Insurance Group (Combined)
Western Mutual Insurance Group (Combined)
Western National Insurance Group (Combined)
Western Reserve Mutual Casualty Company (Combined)
Wisconsin County Mutual Group (Combined)
Safeway Insurance Company (Combined)
Union Mutual of Vermont Companies (Combined)

Reinsurer Composition (36 NAIC Companies)

Arch Reinsurance Co.	Putnam Reinsurance Co.
AXIS Reinsurance Co.	PXRE Reinsurance Co.
Dorinco Reinsurance Co.	QBE Reinsurance Corp.
EMC Reinsurance Co.	Odyssey America Re Corp.
Endurance Re Corp. of America	PARIS RE America Insurance Co.
Everest Reinsurance Co.	Partner Re Co. of the U.S.
Excalibur Reinsurance Corp.	Platinum Underwriters Re Inc.
Finial Reinsurance Co.	Putnam Reinsurance Co.
General Reinsurance Corp.	PXRE Reinsurance Co.
Global Reinsurance Corp. of Am	QBE Reinsurance Corp.
Munich American Re Co.	SCOR Reinsurance Co.
Munich Reinsurance America Inc	Shelter Reinsurance Co.
New England Reinsurance Corp.	Swiss Reinsurance America Corp
New Jersey Re-Insurance Co.	Toa Reinsurance Co. of America
Odyssey America Re Corp.	Transatlantic Reinsurance Co.
PARIS RE America Insurance Co.	Trenwick America Re Corp.
Partner Re Co. of the U.S.	White Mountains Re Co. of Am
Platinum Underwriters Re Inc.	XL Reinsurance America Inc.



The Value of Economic Capital Modeling

Enterprise Risk Management Defined

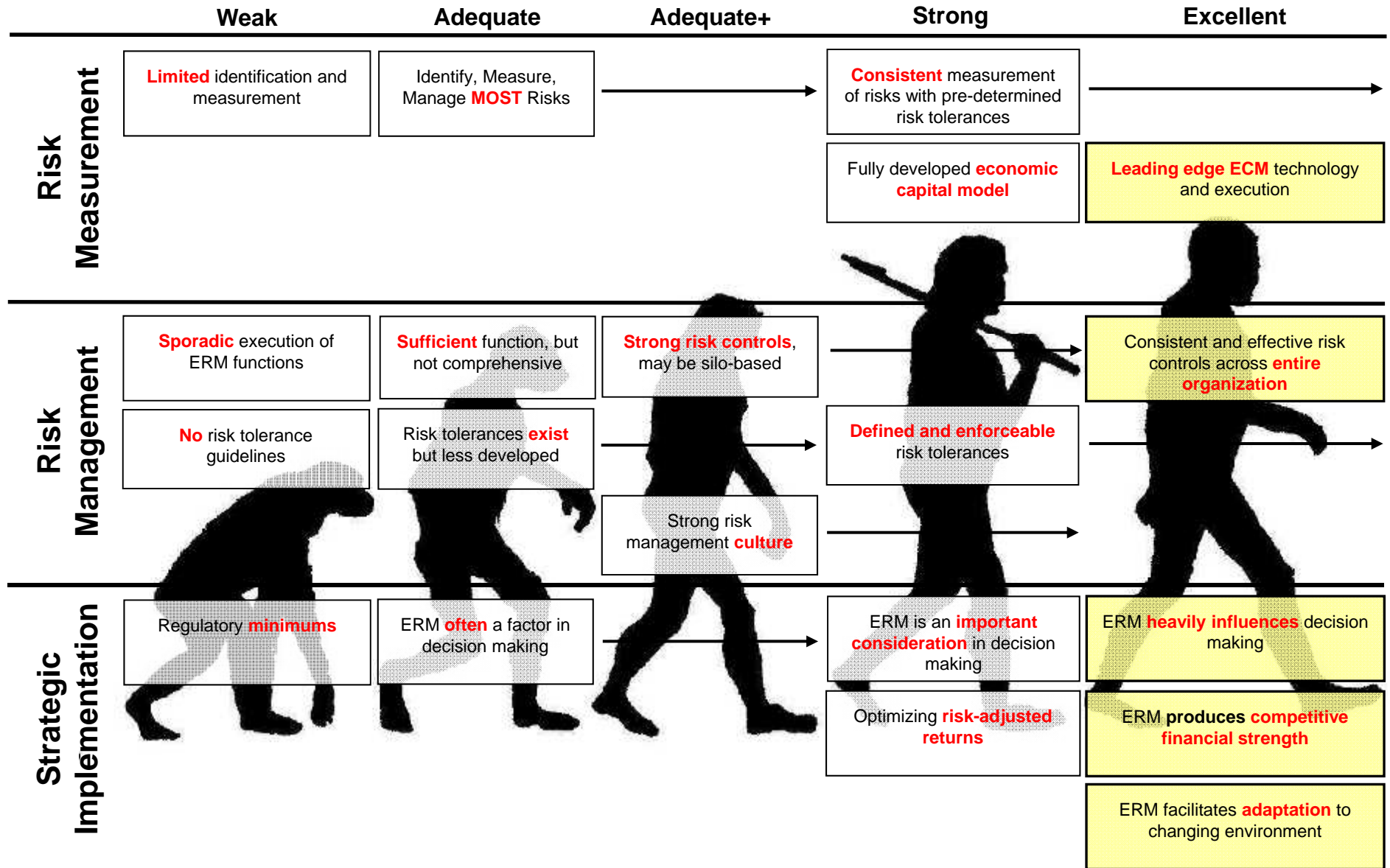
- Enterprise Risk Management is the process of systematically and comprehensively:
 - **Identifying** critical risks
 - **Assessing** and **quantifying** their impacts, where possible
 - Implementing integrated strategies to **mitigate, manage, and price** risk.
 - Thereby **maximizing enterprise value**

Establishing Risk Thresholds

Definitions

- Risk **Profile**:
 - Parameters for executing a business strategy.
 - Classes of business, rating tiers, residual vs. commercial market
 - Expense structure
 - Etc.
- Risk **Appetite**:
 - Acceptable uncertainty a company given the corresponding reward.
 - “Retention of net catastrophic risk less than or equal to peers”
 - “Avoidance of excessive underwriting volatility”
 - Etc.
- Risk **Tolerance**:
 - Limits of a company’s capacity for taking on risk.
 - “Risk exposure to medical inflation as a percentage of surplus”
 - “Probability of maintaining an A rating”
 - Etc.

The Evolution of an Excellent ERM Practice





Illustrative Tables, Weighted Co-TVaR

Illustrative Tables

Various Combinations of Co-TVaR, Weighted 1 to 1

Relative Preference to Losses in Co-TVaR _B Zone		Weight to Co-TVaR _A : 0.50 1 to 1									
Co-TVaR _B		0.800	0.900	0.950	0.960	0.980	0.990	0.995	0.996	0.998	0.999
Co-TVaR _A		5	10	20	25	50	100	200	250	500	1,000
0.800	5		3.0	5.0	6.0	11.0	21.0	41.0	51.0	101.0	201.0
0.900	10			3.0	3.5	6.0	11.0	21.0	26.0	51.0	101.0
0.950	20				2.3	3.5	6.0	11.0	13.5	26.0	51.0
0.960	25					3.0	5.0	9.0	11.0	21.0	41.0
0.980	50						3.0	5.0	6.0	11.0	21.0
0.990	100							3.0	3.5	6.0	11.0
0.995	200								2.3	3.5	6.0
0.996	250									3.0	5.0
0.998	500										3.0
0.999	1,000										

Illustrative Tables

Various Combinations of Co-TVaR, Weighted 1 to 2

Relative Preference to Losses in Co-TVaR_B Zone Weight to Co-TVaR_A: **0.33** 1 to 2

Co-TVaR _B		0.800	0.900	0.950	0.960	0.980	0.990	0.995	0.996	0.998	0.999
Co-TVaR _A		5	10	20	25	50	100	200	250	500	1,000
0.800	5		5.0	9.0	11.0	21.0	41.0	81.0	101.0	201.0	401.0
0.900	10			5.0	6.0	11.0	21.0	41.0	51.0	101.0	201.0
0.950	20				3.5	6.0	11.0	21.0	26.0	51.0	101.0
0.960	25					5.0	9.0	17.0	21.0	41.0	81.0
0.980	50						5.0	9.0	11.0	21.0	41.0
0.990	100							5.0	6.0	11.0	21.0
0.995	200								3.5	6.0	11.0
0.996	250									5.0	9.0
0.998	500										5.0
0.999	1,000										

Illustrative Tables

Various Combinations of Co-TVaR, Weighted 1 to 3

Relative Preference to Losses in Co-TVaR _B Zone		Weight to Co-TVaR _A : 0.25 1 to 3									
Co-TVaR _B		0.800	0.900	0.950	0.960	0.980	0.990	0.995	0.996	0.998	0.999
Co-TVaR _A		5	10	20	25	50	100	200	250	500	1,000
0.800	5		7.0	13.0	16.0	31.0	61.0	121.0	151.0	301.0	601.0
0.900	10			7.0	8.5	16.0	31.0	61.0	76.0	151.0	301.0
0.950	20				4.8	8.5	16.0	31.0	38.5	76.0	151.0
0.960	25					7.0	13.0	25.0	31.0	61.0	121.0
0.980	50						7.0	13.0	16.0	31.0	61.0
0.990	100							7.0	8.5	16.0	31.0
0.995	200								4.8	8.5	16.0
0.996	250									7.0	13.0
0.998	500										7.0
0.999	1,000										

Illustrative Tables

Various Combinations of Co-TVaR, Weighted 1 to 4

Relative Preference to Losses in Co-TVaR_B Zone

Weight to Co-TVaR_A: **0.20** 1 to 4

Co-TVaR _A \ Co-TVaR _B	0.800	0.900	0.950	0.960	0.980	0.990	0.995	0.996	0.998	0.999
	5	10	20	25	50	100	200	250	500	1,000
0.800	5	9.0	17.0	21.0	41.0	81.0	161.0	201.0	401.0	801.0
0.900	10		9.0	11.0	21.0	41.0	81.0	101.0	201.0	401.0
0.950	20			6.0	11.0	21.0	41.0	51.0	101.0	201.0
0.960	25				9.0	17.0	33.0	41.0	81.0	161.0
0.980	50					9.0	17.0	21.0	41.0	81.0
0.990	100						9.0	11.0	21.0	41.0
0.995	200							6.0	11.0	21.0
0.996	250								9.0	17.0
0.998	500									9.0
0.999	1,000									

