CONNING

CAS ERM Seminar

CS4: ERM in Practice – Case Studies and ORSA Best Practices Regarding Quantitative and Qualitative Components of the ERM Framework

Daniel Finn, FCAS, ASA

Edward Yao, FCAS, CFA, CERA

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OVERVIEW OF NAIC ORSA

NAIC ORSA Overview

ORSA is Own Risk and Solvency Assessment

- NAIC Model Law adopted in September 2012
- NAIC Guidance Manual revised March 2013
- Effective date: January 1, 2015

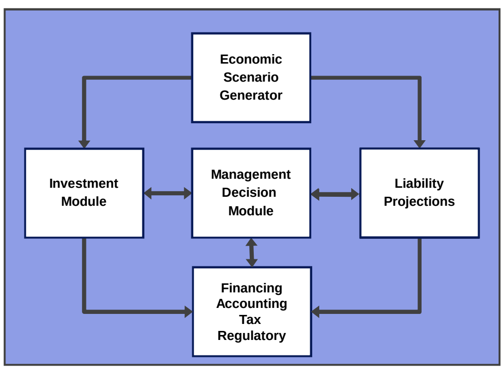
A new regulatory requirement intended to:

- Foster effective enterprise risk management
- Provide a group level perspective on risk and capital

Required of

- Companies with gross written premium over $500 million
- Groups with gross written premium over $1 billion
- Other entities in special circumstances (e.g., financial distress)

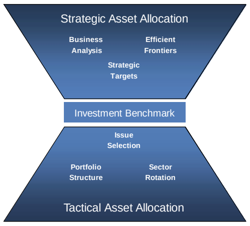
Architecture of Financial Modeling Platform



CASE STUDY: STRATEGIC ASSET ALLOCATION

Investment Process

Integrated approach aligns investment strategies with business needs



- Strategic Asset Allocation provides a blueprint for the portfolio
- Custom benchmark and investment guidelines are developed to articulate the blueprint
- Tactical Asset Allocation decisions focus on optimizing the portfolio's structure, asset allocation and issue selection

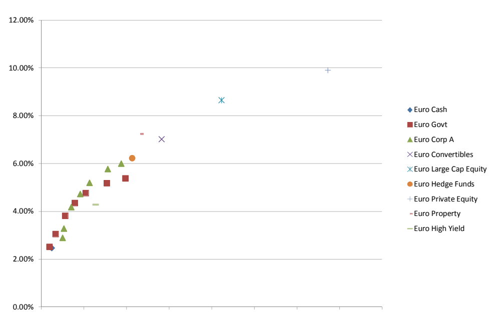
Strategic Asset Allocation

Investment Strategy based on company's:
- Liabilities
- Business operations
- Competitive environment
- Accounting, regulatory and tax constraints
- Strategic goals
- Risk tolerance

Based on enterprise financial modeling
- Assets, liabilities, future underwriting and investment results
- 3-5 year horizon typical for p/c companies
- Recommendations and implementation plans incorporate current and expected market conditions

Stochastic modeling provides insights into tail risks
- Consistent with evolving regulatory environment, such as ORSA and Solvency II
- Consistent with evolving rating agency approach, such as Best's new BCAR

Long Term Assumptions of Asset Classes Returns



Euro Govt. and Euro Corp A are shown by maturity buckets.

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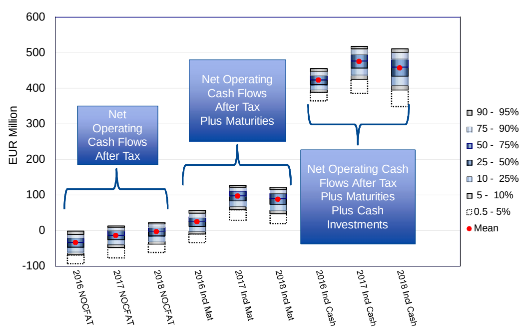
Next Steps…

ALM
- Current Investment Portfolio
- Liabilities/Underwriting

Simulation
- Thousands of scenarios
- Multiple periods

Calibration
- Initial condition
- Reconciliation to business plan

Net Operating Cash Flows, with Maturities, and with Cash



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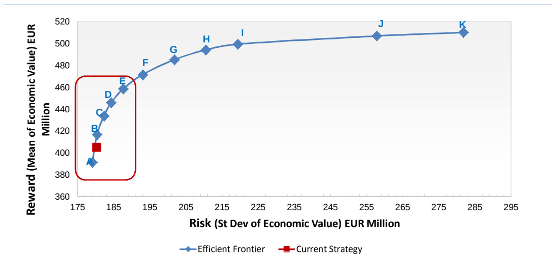
Efficient Frontier



Sector	Current Allocation	A	B	C	D	E	G	H	I	J	K
Cash	38%	51%	39%	17%	10%	10%	5%	5%	5%	5%	5%
Govt	10%	26%	14%	19%	20%	6%	0%	0%	0%	0%	0%
Corporate	45%	23%	38%	48%	50%	63%	65%	60%	55%	55%	55%
European Equity	3%	0%	0%	0%	0%	1%	10%	15%	20%	20%	20%
Alternatives	4%	0%	9%	16%	20%	20%	20%	20%	20%	20%	20%
Duration	2.0	1.9	3.1	4.3	4.7	5.8	10.2	12.3	15.5	16.7	16.7
Δreward/Δrisk		12.0	19.2	8.5	6.4	4.2	1.7	1.0	0.6	0.2	0.1

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Efficient Frontier Analysis – Strategic Indications

Key strategic factors from SAA

- Duration
- Corporate vs government bonds
- Risky asset classes

Indications from efficient frontier analysis

- Optimal duration of fixed income investments ranges from 4-7 years
- Optimal allocation to government bonds and cash: 10%-50%
- Optimal allocation to IG corporate bonds: 35%-70%
- Optimal allocation to risky asset classes (equities etc.): 10%-20%

Higher risk/higher reward strategies have:

- Longer duration
- Lower allocations to governments and cash
- Higher allocations to corporates
- Higher allocations to risky assets

Alternative Portfolio Analysis

Evaluating the impact on key financial metrics of varying the main strategic factors driving investment risk and reward

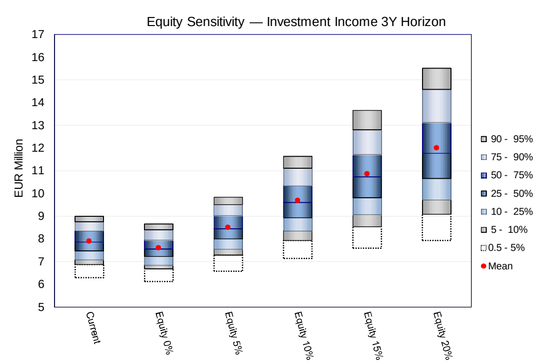
The strategic factors:

- Duration
- Equity Allocation
- Alternative Investment (Riskier Assets) Allocation
- Corporate/Credit Bond Allocation

The key financial metrics:

- Operating Performance: Investment Income
- Financial Strength: IFRS Shareholder Equity
- Regulatory Capital Adequacy: Solvency II Capital Adequacy Ratio

Alternative Equity Allocation



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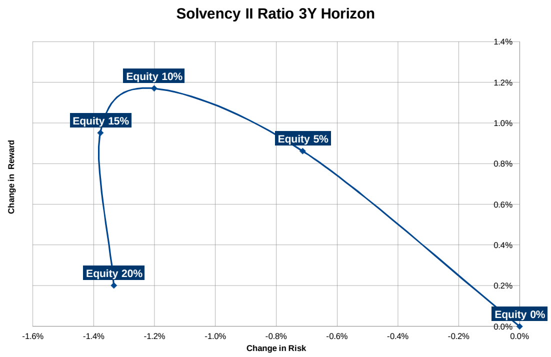
Alternative Equity Allocation



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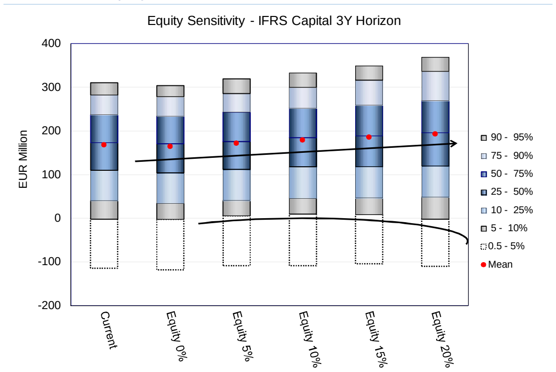
Alternative Equity Allocation



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Recommended Strategic Benchmark Asset Allocation 1/3

Recommended Benchmark Strategy:

Asset Class	Current Portfolio	Recommended Portfolio
Cash	38%	15%
Government Bonds	10%	30%
Corporate Bonds (Investment Grade)	45%	40%
Large Cap Equity	3%	5%
Alternative Investment	4%	10%
Fixed Income Duration (years)	2.0	4.0

Portfolio Liquidity and Cash Allocation:

- Low liquidity Risk
- Allow duration extension

Equity Allocation:

- Higher investment income
- Improve risk/reward outlook of Solvency II Capital Adequacy Ratio
- Improve downside risk of IFRS Shareholder Equity

Recommended Strategic Benchmark Asset Allocation 2/3

Alternative Investment Allocation:

- Improve risk/reward outlook of Economic Value
- Improve risk/reward outlook of Capital Adequacy Ratio
- Strengthen average IFRA Shareholder Equity with higher volatility

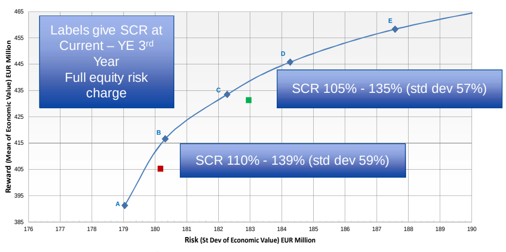
Corporate Bond Allocation:

- Indicated by EV Efficient Frontier
- Improve risk/reward outlook of Capital Adequacy Ratio
- Maintain average IFRS Shareholder Equity with lower risk

Fixed Income Duration:

- Indicated by EV Efficient Frontier
- Higher investment income
- Optimize risk/reward tradeoff of Capital Adequacy Ratio in a long term

Efficient Frontier Analysis – Current and Recommended Portfolios



Sector	Current Portfolio	Recommended Portfolio	A	B	C	D	E
Cash and Govt	48%	45%	77%	53%	36%	25%	11%
Corporate	45%	40%	23%	38%	48%	55%	68%
European Equity	3%	5%	0%	0%	0%	0%	1%
Alternatives	4%	10%	0%	9%	16%	20%	20%
Duration	2.0	4.0	1.9	3.1	4.3	5.2	6.2

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Comparison of SCR and Solvency Ratio (Full Equity Risk Charge) at Time Zero

SCR Components in € m	Current Full Charge	Recommended Full Charge
Interest Rate	0.3	11.1
Equity	31.4	49.5
Property	7.9	11.5
Spread	30.2	23.0
Currency	5.3	9.7
Concentration	3.4	0.0
Market SCR	**65.0**	**87.0**
Counterparty Default	**14.1**	**10.9**
Non-Life Underwriting	**200.0**	**200.0**
Non SLT Health	**4.0**	**4.0**
Basic SCR	**233.2**	**243.4**
SCR	**241.1**	**251.3**
Own Funds	**264.1**	**264.1**
Solvency Ratio	**110%**	**105%**

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Summary – Recommendation

First Step Strategy

1. Move 20% investment from Cash into government bonds
2. Increase duration from 2.0 to 3.3

Strategic Benchmark Strategy

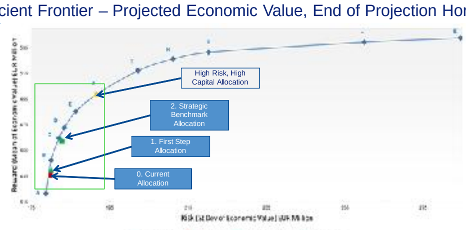
1. Increase Allocation to riskier assets (7% to 15%)
2. Further extend duration to 4.0

High Risk, High Capital Strategy

For highly capitalized company with a significant risk tolerance:

1. Further increase allocation to equity and alternative investment to 25%
2. Further extension of Duration to 7.0 years
3. Increase allocation of Corporate Bonds relative to Government Bonds

Efficient Frontier – Projected Economic Value, End of Projection Horizon



Sector	0. Current Allocation	1. First Step Allocation	2. Strategic Benchmark Allocation	A	B	C	D	E	High Risk, High Capital Allocation
Cash	38%	18%	15%	51%	39%	17%	10%	10%	10%
Govt	10%	30%	30%	26%	14%	19%	20%	6%	0%
Corporate	45%	45%	40%	23%	38%	48%	50%	63%	65%
European Equity	3%	3%	5%	0%	0%	0%	0%	1%	5%
Alternatives	4%	4%	10%	0%	9%	16%	20%	20%	20%
Fixed Income Duration (including cash)	2.0	3.3	4.0	1.9	3.1	4.3	4.7	5.8	7.1
Improvement in reward per € of additional risk	-	21.0	9.1	12.0	19.2	8.5	6.4	4.2	2.5

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Strategic Asset Allocations – Selected Alternative Strategies

Asset Class Allocation and Key Metrics: Alternative Strategies

	Current Allocation	First Step Allocation	Strategic Target Allocation	High Risk, High Capital Allocation
Required Solvency Capital (Time 0)				
Div. Effect in Market Risk € M	€ 13 M	€ 14 M	€ 19 M	€ 33 M
Market Risk, Diversified € M	€ 65 M	€ 69 M	€ 87 M	€ 147 M
Market Risk, Div. as % of Total, Div.	27%	29%	35%	51%
Div. Effect in Total Risk Capital € M	€ 63 M	€ 64 M	€ 71 M	€ 94 M
Total Risk Capital, Diversified € M	€ 241 M	€ 241 M	€ 251 M	€ 290 M
Solvency Ratio	110%	110%	105%	93%

According to the EIOPA report on QIS5, for the European general insurance market as a whole, market risk capital requirement is around 33% of overall risk capital requirement

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Key Financial Metrics (Projections from Financial Model)

Selected Asset Allocation	Current Allocation	First Step Allocation	Strategic Benchmark Allocation	High Risk High Capital Allocation
IFRS Shareholder Equity (End of Projection Horizon)				
a) Expected Value (Average) €M	202	201	211	217
b) Volatility (Standard Deviation) €M	96	97	100	116
c) Volatility as % of (a)	47%	48%	47%	53%
d) Downside Deviation* (1.5% level) as % of (a)	113%	112%	113%	130%
Investment Income (3rd Year)				
a) Expected Value (Average) €M	8.1	8.3	7.1	13.8
b) Volatility (Standard Deviation) €M	0.7	0.6	1.9	1.7
c) Volatility as % of (a)	9%	7%	27%	13%
d) Downside Deviation* (1.5% level) as % of (a)	17%	16%	58%	30%
Solvency Ratio (End of Projection Horizon)				
a) Expected Value (Average) in Percentage Points	139%	139%	135%	117%
b) Volatility (Standard Deviation) in Percentage Points	59%	59%	57%	50%
c) Volatility as % of (a)	43%	43%	42%	43%
d) Downside Deviation* (1.5% level) as % of (a)	93%	89%	89%	102%

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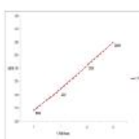
Path to Implementation

Step 1 : Increase Allocation to Government Bonds

Step 2:
1) Add new asset classes: Convertible Bonds, Infrastructure Equity, Property Funds
2) Subject to minimum SCR

Continue moving to Long-term SAA Benchmark: Using 1%-2 of SCR at a time



CASE STUDY: ECONOMIC CAPITAL MODEL

Key Requirements for Economic Capital Models

Robust risk models on both sides of the balance sheet

- Economic Scenarios – Calibrated to all the volatility of the 20th and 21st centuries
- Assets – Market Risk and Credit Risk
- Insurance – Reserving and Underwriting Risk
- Strategic and Operational risk

Stress testing capability

- Stochastic stress testing on the enterprise at once
- Deterministic stress testing

Multi-period analysis

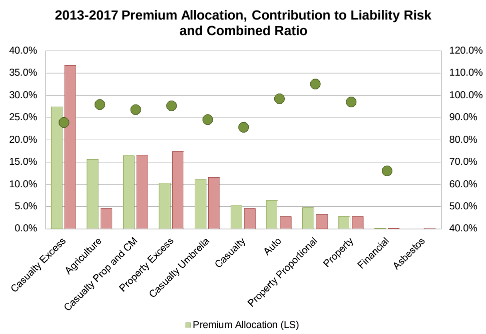
- Many risk factors manifest themselves over multiple time periods
- Model must also consider management and market reactions to simulated events

Unified, integrated model of all assets and liabilities

- Modeling distinct business entities and at the consolidated enterprise level in the same ECM framework
- Modeling management actions, integrated within the model
- "Capital Fungibility" – Flows of capital and funds between entities must reflect reality
- Liquidity risk evaluated in a consistent ECM framework

The "Use Test" – Model must be transparent and granular enough to be used by management

Five Year Liability Risk by Insurance Segment



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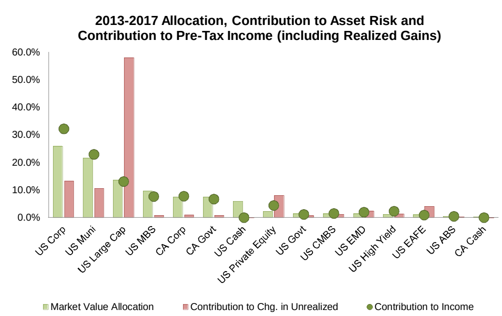
Five Year Asset Risk by Asset Class



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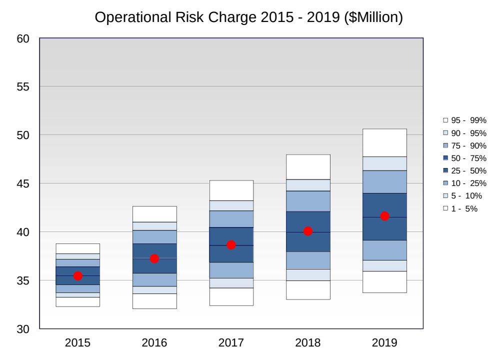
Operational Risk Charge



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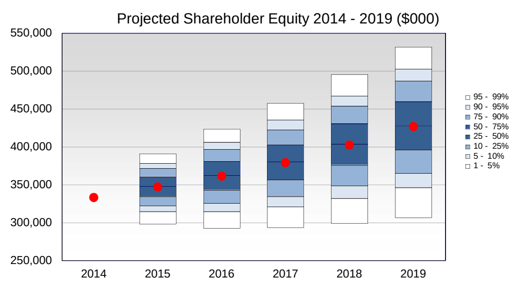
Projected Distribution of Key Financials



- GAAP Equity on average grows 5% per year over 5 year horizon
- Rising average GAAP Equity overcomes the increasing volatility leads to a slightly improved downside risk overtime
- 5th percentile of GAAP at the end of 2015 is about 5.6% below reported year-end 2014 level

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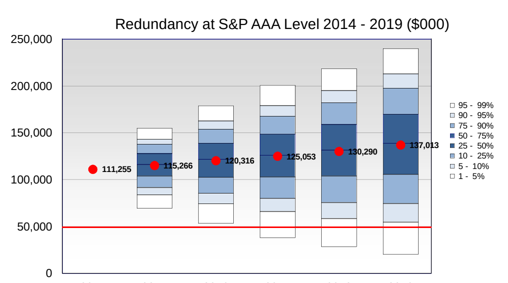
Projected Distribution of Key Financials



- The probability of a redundancy lower than $50 million is less than 1% in 2015 and 2016 and about 1 - 5% beyond 2016.
- Among 10,000 simulated scenarios, 662 paths (6.6%) had a redundancy lower than $50 million in at least one of five simulated years.

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STUDY OF MANAGEMENT RULES

Investment Rules

Duration Rule:

- Increase when interest rate goes up over the past 12 months
- Decrease when interest rate goes down over the past 12 months

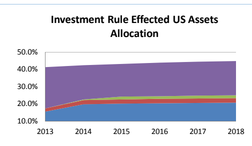
Capital Adequacy Rule for risky asset allocation:

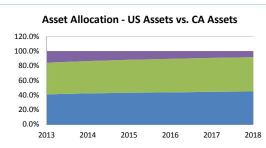
- Increase allocation to risky assets when there is extra capital redundancy
- Maintain current allocation otherwise

Inflation Protective Asset Allocation Rule

- Increase allocation to inflation protective assets when actual inflation is higher than expected inflation
- Maintain current allocation otherwise

Investment Rules





	2013	2014	2015	2016	2017	2018
US Fixed Income Duration	5.24	5.26	5.31	5.34	5.35	5.37
CA Fixed Income Duration	2.75	2.77	2.85	2.87	2.92	2.95
Total Portfolio Duration	*4.76*	*4.84*	*4.95*	*5.02*	*5.08*	*5.12*
Actual Inflation		1.36%	1.43%	1.52%	1.63%	1.70%
Inflation Expectation		2.31%	1.44%	1.47%	1.55%	1.62%
Actual over Expected		*-0.95%*	*0.00%*	*0.05%*	*0.08%*	*0.08%*
S&P AAA Capital Redundancy ($Million)		151	140	145	152	160
10 Year US Treasury Yield	2.78%	3.03%	3.23%	3.36%	3.49%	3.58%
10 Year CA Treasury Yield	2.56%	3.05%	3.28%	3.44%	3.59%	3.70%

- Rising interest rates lead to duration extension
- Higher than expected inflation leads to allocation in TIPS
- High capital redundancy leads to more allocation to Stocks and Private Equity.
- Decreasing allocation in CA assets is mainly due to proportionally decreasing of CA business.

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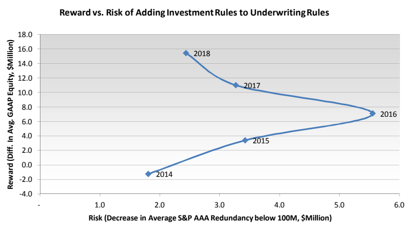
Investment Rules



- Downside risk measured by the average S&P AAA Capital Redundancy below $50 Million slightly increases.
- Reward measured by the increase of GAAP Equity is much more than the additional downside risk.

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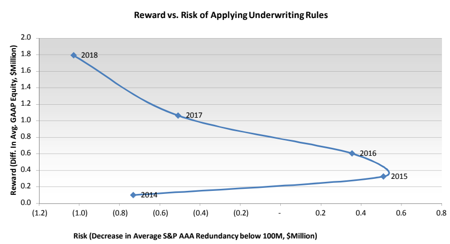
Underwriting Management Rules



- Downside risk measured by the average S&P AAA Capital Redundancy below $50 Million slightly decreases.
- Reward measured by the increase of GAAP Equity increases.

Prepared by Conning, Inc. Source: ADVISE® Enterprise Risk Modeler model using hypothetical data.

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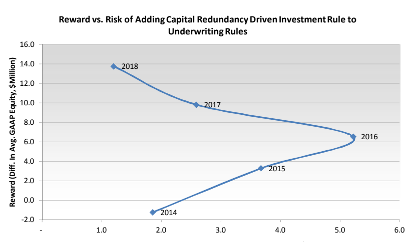
Adding Capital Redundancy Driven Rule to Underwriting Rules



- Downside risk measured by the average S&P AAA Capital Redundancy below $50 Million slightly increases.
- Reward measured by the increase of GAAP Equity is much more than the additional downside risk.

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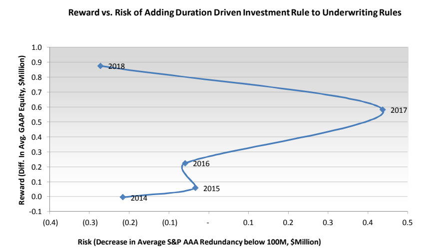
Adding Duration Investment Rule to Underwriting Rules



- Duration rule brings slightly increased reward and decreased downside risk in five year horizon.

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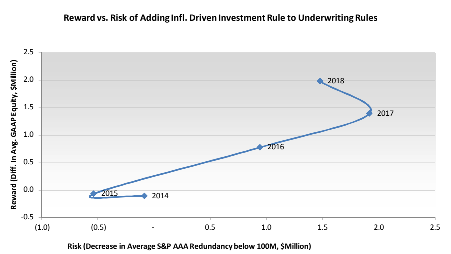
Adding Inflation Driven Investment Rule to Underwriting Rules



- Inflation driven investment rule brings slightly increased reward and risk and the risk/reward trade-off ratio is about 1.0

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STRESS TESTING

Stress Testing – Methodology

- Capital Metric: GAAP Equity
- Three Risk Factors: CAT Losses, US Consumer Price Inflation, US Interest Rate
- Criteria of Selecting Adverse Scenarios: 25 worst scenarios out of 10000 scenarios
  - Capital: 0.25 percentile
  - CAT Loss: 99.75 percentile
  - Inflation: 99.75 percentile
  - Interest rate: 99.75 percentile
- Severity Measures of Adverse Scenarios:
  - TVaR from Mean
  - Likelihood of worse than TVaR
- Time horizon: 5 year and 1 year
  - For 5 year: Use 5-year cumulated CAT loss and cumulated Inflation and End-of-5th-Year Interest Rate

Stress Testing

	Five Year Horizon						
	Severe CAT Losses		High Inflation		High Interest Rate		Average of All Scenarios
	Severity	Likelihood	Severity	Likelihood	Severity	Likelihood	
Total Gross CAT Losses of next 5 years ($Million)	161	1-in-1000	35	1-in-3	37	1-in-3	31
Average US Inflation (%) per year	2.15%	1-in-3	8.16%	1-in-1000	6.96%	1-in-200	1.66%
Average US 10 Year Treasury Yield Increase per year (bps)	36	1-in-3	256	1-in-250	333	1-in-1000	16

	One Year Horizon						
	Severe CAT Losses		High Inflation		High Interest Rate		Average of All Scenarios
	Severity	Likelihood	Severity	Likelihood	Severity	Likelihood	
Total Gross CAT Losses of next year ($Million)	78	1-in-1000	7	1-in-4	5	1-in-4	5
US Inflation over next year (%)	1.68%	1-in-3	5.65%	1-in-1000	4.70%	1-in-167	1.37%
US 10 Year Treasury Yield Increase over next year (bps)	42	1-in-2	513	1-in-143	677	1-in-1000	22

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Stress Testing

Impact on Capital (Deviation from Expectation):

		Five Year Horizon	One Year Horizon
		Severe CAT Losses	Severe CAT Losses
		2018	*2014*
GAAP	$Million	(48.1)	(21.2)
	% of Expected Level	-10.2%	-5.7%
		High Inflation	High Inflation
		2018	*2014*
GAAP	$Million	(288.7)	(78.0)
	% of Expected Level	-61.3%	-21.0%
		High Interest Rate	High Interest Rate
		2018	*2014*
GAAP	$Million	(359.1)	(93.6)
	% of Expected Level	-76.3%	-25.2%

High interest rates and high inflation rates can severely damage the capital, particularly when the lines of business are sensitive to the same inflation index at the same time

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Stress Testing

Breakdown of GAAP Equity Impact with High Interest Rate Scenarios

Contribution to Risk over One Year

Difference between Simulation Average and Average of High Interest Scenarios (highest 0.25%), After Tax

Source	Average	Average of Worst 1%	Amount	%
Underwriting Income	**15,921,650**	**(5,178,055)**	**(21,099,705)**	**23%**
Investment Income	19,774,423	19,270,459	(503,965)	1%
Investment Realized Losses	341,733	(532,183)	(873,916)	1%
Foreign Exchange Effect	(4,231,264)	(3,054,283)	1,176,981	-1%
Tax Incurred	(8,318,033)	(2,661,916)	5,656,118	-6%
Dividends	(8,836,195)	(8,836,195)	-	0%
Change in Investment Unrealized Gains/Losses	**766,480**	**(77,175,392)**	**(77,941,872)**	**83%**
Change in GAAP Shareholders Equity	13,652,131	(79,934,228)	(93,586,359)	100%

Contribution to Risk over Five Years

Difference between Simulation Average and Average of High Interest Scenarios (highest 0.25%), After Tax

Source				%
Underwriting Income	**85,246,017**	**(265,612,556)**	**(350,858,573)**	**98%**
Investment Income	100,188,655	163,550,957	63,362,302	-18%
Investment Realized Losses	13,123,960	(23,526,794)	(36,650,754)	10%
Foreign Exchange Effect	(10,639,167)	(5,514,029)	5,125,138	-1%
Tax Incurred	(56,223,962)	(2,979,039)	53,244,923	-15%
Dividends	(31,528,157)	(10,744,035)	20,784,122	-6%
Change in Investment Unrealized Gains/Losses	**22,807,754**	**(91,299,063)**	**(114,106,817)**	**32%**
Change in GAAP Shareholders Equity	113,595,649	(245,504,010)	(359,099,659)	100%

Prepared by Conning, Inc. Source: ADVISE® Enterprise Risk Modeler model using hypothetical data.

ALTERNATIVE BUSINESS/OPERATIONAL STRATEGIES/SCENARIOS ANALYSIS

Alternative Shareholder Dividend Policy

First year USD $25 million, second year up to USD $25 million subject to rules B and C, and third year up to USD $50 million minus dividend paid in the second year subject to rules B and C below, and then revert

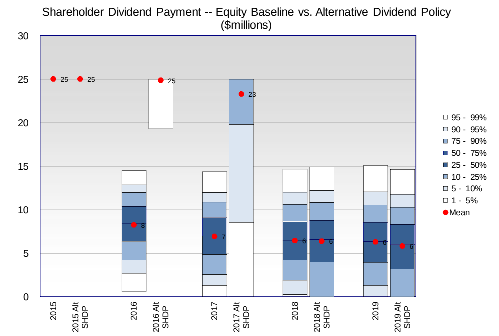
Dividend Rules

A. The current rule will be modified to be 30% (changed from 25%) of net Statutory income;

B. The company must maintain USD $50 million of redundant capital at the S&P AAA level; and

C. The dividend paid cannot be more than 10% of the previous year end statutory surplus.

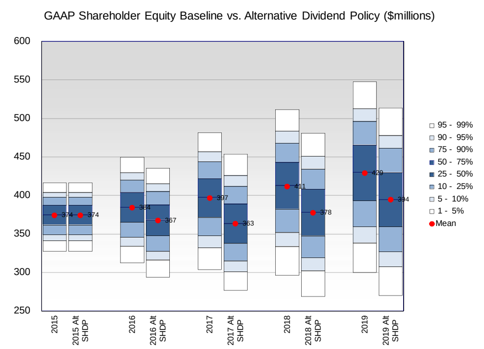
Shareholder Dividend Payment



Prepared by Conning, Inc. Source: ADVISE® Enterprise Risk Modeler model using hypothetical data.

CONNING 49

Projected Distribution of Key Financials



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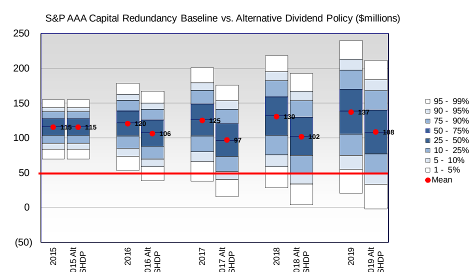
Projected Distribution of Key Financials



- Alternative dividend policy significantly increases the probability of a redundancy lower than $50 million for 2016 and beyond.
- Among 10,000 simulated scenarios, 1,923 paths (19.2%) had a redundancy lower than $50 million in at least one of five simulated years.

Prepared by Conning, Inc. Source: ADVISE® Enterprise Risk Modeler model using hypothetical data.

CONNING 51

THANK YOU!

Danial Finn, Director
Risk Solutions
Conning
+1-860-299-2353
daniel.finn@conning.com

Edward Yao, Director
Risk Solutions
Conning
+1-860-299-2367
edward.yao@conning.com

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