



# Using ERM to Manage Interactivity Between Operational Risk, Reserve Risk, and Underwriting Risk

Kevin M. Madigan, PhD, ACAS, MAAA, CERA  
Director, Willis Towers Watson, New York

Mario E. DiCaro, FCAS, MAAA, CERA  
VP, Capital Modeling & Analytics, HCC Service Company, Inc., Houston

April 8, 2016

# Insurance Risk for P&C Insurers

Frequently broken into components

- Underwriting Risk
  - In-force or future policies – actual business written will differ from intended (pricing, adverse selection, misunderstanding of assumed risk, ineffective T&C, etc.)
- Reserving Risk
  - Ultimate liabilities will differ significantly from expected
- Catastrophe Risk
  - Significant overlap with underwriting risk

These are not independent and distinct categories of risk

Capital models tend to treat separately for obvious reasons

# Risk Appetite and Strategic Objectives

Risk appetite framework supports achievement of strategic objectives; mitigates risk of mission failure.

Preserving Capital Adequacy	Achieving Targeted Performance
<ul style="list-style-type: none"> <li>■ Avoid insolvency or impairment</li> <li>■ Avoid rating agency actions</li> <li>■ Avoid regulatory intervention</li> <li>■ Avoid adverse actions by policyholders</li> <li>■ Avoid adverse actions by distributors</li> </ul>	<ul style="list-style-type: none"> <li>■ Avoid sustained underperformance</li> <li>■ Avoid excessive volatility to the extent it undermines confidence</li> <li>■ Avoid poor performance relative to peers, if constituents care</li> </ul>
Maintaining Liquidity	Protecting Franchise Value
<ul style="list-style-type: none"> <li>■ Handle extraordinary policyholder obligations</li> <li>■ Handle unusual illiquidity in asset markets</li> </ul>	<ul style="list-style-type: none"> <li>■ Avoid damage to reputation</li> <li>■ Avoid loss of affinity</li> <li>■ Avoid loss of employee engagement</li> <li>■ Avoid loss of sources of competitive advantage</li> </ul>

# Risk Appetite and Strategic Objectives

Risk appetite framework supports achievement of strategic objectives; mitigates risk of mission failure.

Preserving Capital Adequacy	Achieving Targeted Performance
Tail risk, reserving risk capital charges	<ul style="list-style-type: none"> <li>■ Accurate ultimate loss projections</li> <li>■ Pricing</li> <li>■ Risk selection</li> <li>■ Capital charges appropriate to business unit / LOB</li> <li>■ Timely entry and exit</li> </ul>
Maintaining Liquidity	Protecting Franchise Value
Accurate ultimate loss and payout projections	Avoid surprising reserve inaccuracies

# Context is Everything

Pricing and underwriting focus on meaningfulness of reserves to project experience of prospective business

Claims department focus on contract language, case reserve estimates, claims adjudication process

Risk function can assist in managing it all

Corporate actuarial / finance focus on variability around the "meat of distribution" and current held capital

Capital modelers focus on tail risk, capital charges, current and prospective capital requirements

# Risk Identification, Prioritization, and Management

ERM can and should institute procedures to reconcile varying assumptions used by corporate actuarial, capital modeling, and pricing / underwriting

ERM can and should institute risk reporting that allows claims, corporate actuarial, and pricing to benchmark their metrics and conclusions against one another

ERM can and should ensure that the Risk Appetite framework (including tolerances and limits) connect the dots between underwriting risk and reserving risk – what do you want the shape of the liability distribution to be?

# Risk Appetite Framework

Components of Risk Appetite framework can be devised to link operational, underwriting, and reserving risk.

- Is risk being driven by estimation and data issues regarding liabilities? **Operational Risk**
- Is risk being driven by process variance? **Insurance Risk**
- Is risk being driven by lack of communication between underwriting, claims, and corporate actuarial? **Operational Risk**
- Is risk being driven by lack of clarity regarding targets / plans? **Strategic Risk**
- Is risk being driven by execution failures regarding strategy? **Strategic and Operational Risk**

All of the above can be (partially) addressed / managed / mitigated via Risk Appetite, Tolerances, and Limits

# Risk Monitoring Operational Risk Examples

## Claims handling & management

Claims philosophy and guidelines undefined or inadequate

Inadequate claims categorisation

Inadequate claims expertise applied per case

Unauthorised claims settlement

Incorrect claims assessment/payments

Fraudulent claims inconsistently identified

Poor communication with third parties

Poor supplier performance or advice

Poor management of subrogation/salvage

Slow or low standard claims service

## Reserving and underwriting

Changes in claims regulation/legislation.





TOKIO MARINE  
HCC

*To Be a Good Company*

# Using ERM to Manage Interactivity Between Operational Risk, Reserve Risk, and Underwriting Risk

ERM Symposium April 2016

Mario DiCaro



# Antitrust Notice

- **The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.**
- **Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.**
- **It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.**

# References

**[S]** Paul Sweeting, “Financial Enterprise Risk Management”, 2011

**[L]** James Lam, “Enterprise Risk Management”, 2014, 2<sup>nd</sup> Ed.

**[HM]** David E. Heppen, Robert S. Miccolis,  
“A Practical Approach to Risk Margins in the Measurement of Insurance Liabilities  
for Property and Casualty (General Insurance) under Developing International  
Financial Reporting Standards”  
29<sup>th</sup> International Congress of Actuaries March 2010

**[CEA]** Solvency Assessment Models Compared  
[http://www.naic.org/documents/committees\\_smi\\_int\\_solvency\\_eu\\_II-cea.pdf](http://www.naic.org/documents/committees_smi_int_solvency_eu_II-cea.pdf)

“The key concept here is the management of all risks on a holistic basis, not just the individual management of each risk.”

**[S]** p2

“Over the longer term, the only alternative to risk management is crisis management – and crisis management is much more expensive, time consuming, and embarrassing.”

**[L]** p3

“A first step to estimating an explicit risk margin is to determine the underlying risk model for unpaid claim amounts.”

**[CEA]** p9

# Let's start with some definitions

## Non-life insurance risk

The risk that the average level of claims in the portfolio is different from that assumed during planning.

### Reserve Risk

This is the risk present in reserves established to pay for claims associated with business underwritten in exposure periods prior to the as-of date.

### Underwriting Risk

Also referred to as Premium Risk. This is the Insurance risk present in business to be underwritten in exposure periods beyond a specific as-of date.

---

## Operational risk

The risk of failure of people, processes, or systems. The failure can be driven by external natural events, criminal behavior, or negligence.

# A traditional approach to making selections

## Completed Rectangle

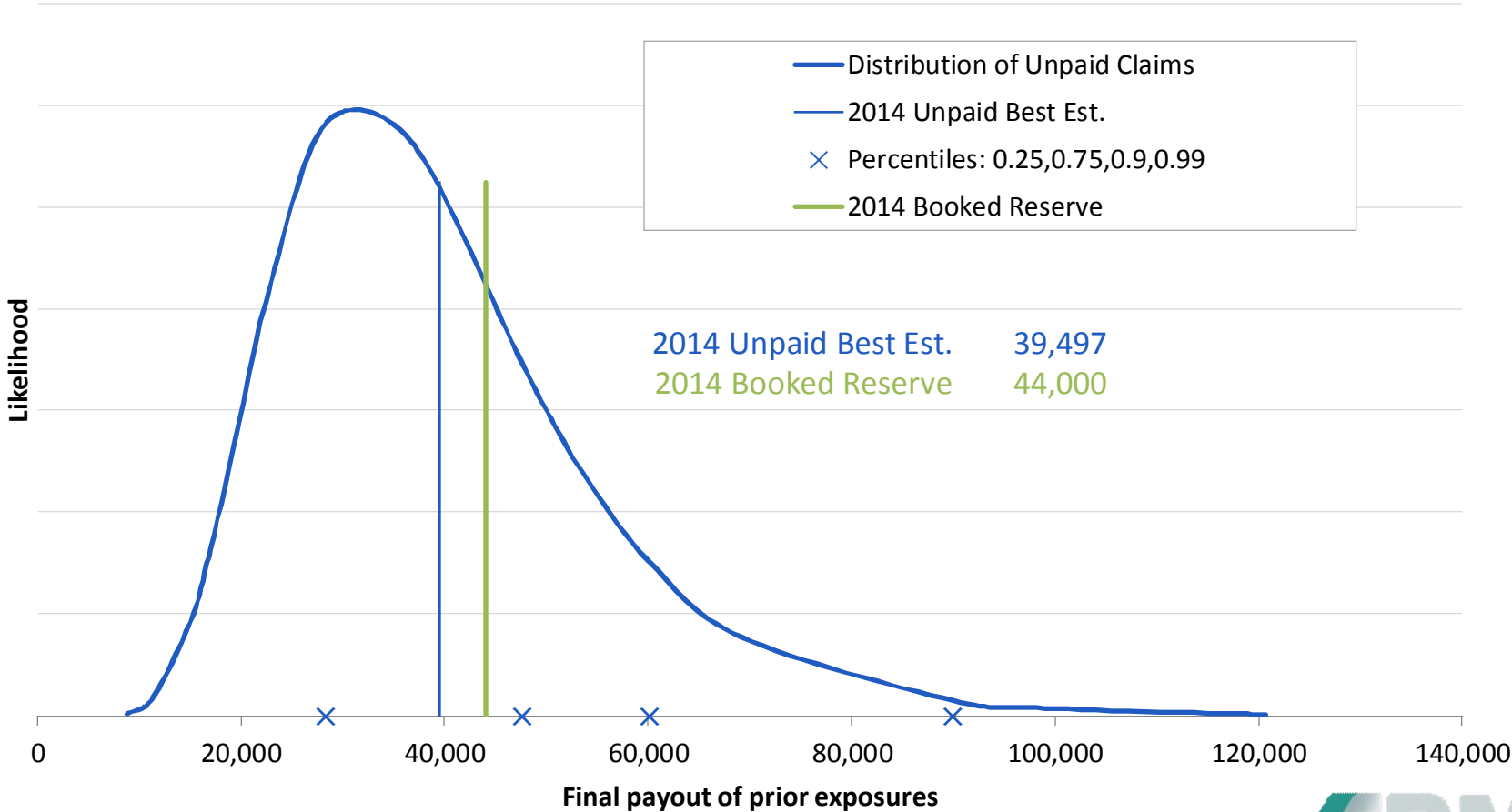
Uwrt Year	Development Period																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1995	4	22	52	85	121	143	164	178	194	202	208	213	214	223	224	225	226	228	228	228
1996	3	18	51	83	135	187	216	237	254	261	268	276	282	285	287	288	289	291	292	292
1997	2	16	60	114	181	241	311	353	379	429	439	461	469	473	476	481	482	483	486	486
1998	3	22	71	125	196	261	337	398	429	444	468	477	490	493	502	517	521	523	526	526
1999	6	36	90	148	217	289	356	392	430	456	484	497	505	522	533	542	545	548	551	551
2000	9	39	84	121	172	248	315	355	382	395	409	429	441	447	451	455	458	460	462	462
2001	8	47	86	147	205	262	320	371	404	421	453	471	489	500	505	510	513	515	518	518
2002	7	33	75	130	186	228	283	312	346	353	365	373	382	390	393	397	399	401	403	403
2003	3	25	86	136	205	259	286	311	331	345	353	362	369	376	380	384	386	388	390	390
2004	1	25	78	150	212	267	304	325	338	352	358	365	372	380	384	387	389	391	393	393
2005	1	24	89	151	210	251	279	302	314	327	334	340	347	354	358	361	363	365	367	367
2006	2	13	52	106	150	198	224	245	259	269	274	279	285	291	294	297	298	300	301	301
2007	0	12	35	77	127	168	194	211	221	229	234	238	243	248	250	253	254	255	257	257
2008	0	4	23	49	79	97	127	137	144	149	152	155	158	161	163	164	165	166	167	167
2009	0	3	12	26	45	56	65	71	74	77	78	80	82	83	84	85	85	86	86	86
2010	0	4	14	31	51	64	74	80	84	87	89	91	93	95	96	97	97	97	98	98
2011	0	3	14	31	49	61	72	77	81	84	86	87	89	91	92	93	93	94	94	94
2012	0	3	18	38	58	74	86	93	98	101	103	105	107	109	111	112	112	113	113	113
2013	0	4	16	33	52	65	76	82	86	89	91	93	95	97	98	99	99	100	100	100
2014	0	3	12	26	40	50	59	64	67	69	70	72	73	75	75	76	77	77	77	77



The booked reserve represents the accommodation for future payout of all claims associated with prior exposure periods. The loss pick is the predicted/budgeted (*feared/hoped*) claims associated with the next year of business.

2014 Unpaid Best Est. 39,497  
 2014 Booked Reserve 44,000  
 2015 Loss Pick 89

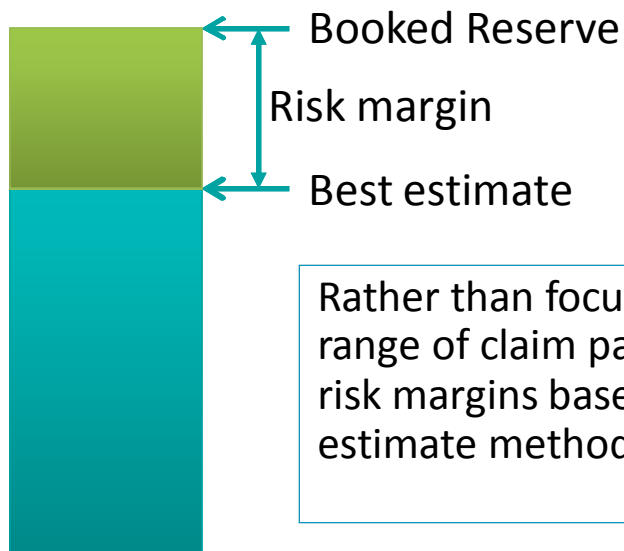
# An ERM view of Reserve Risk



# Reconciling ERM with Reserving

## Reserving needs

- A booked reserve
  - Usually with some amount of room for error i.e. risk margin
  - Depending on the jurisdiction that risk margin may or may not be explicitly defined



## ERM needs

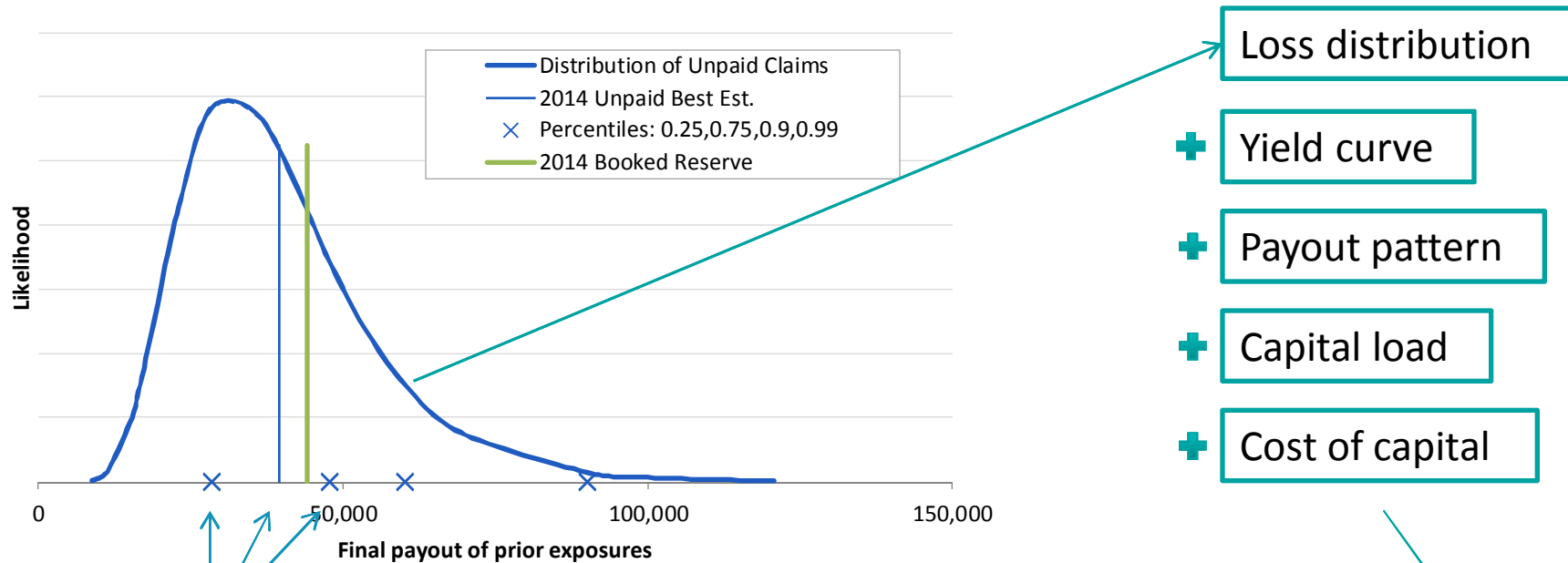
- Reserve risk
  - Defined with a distribution usually
  - May or may not account for risk margin
  - May have adjustment for time horizon

## Management needs

- Consistency and clarity in communication
- Room for qualitative adjustments

Rather than focusing on a range of reserving methods for understanding the range of claim payouts, use a distribution-based model to develop consistent risk margins based on likelihood or a cost of capital approach. Then use point estimate methods to demonstrate reasonability of selections.

# An ERM view of Reserve Risk



Under **current U.S. stat and GAAP** reserving you could use specified percentiles: 25%ile and 75%ile to set your range – then your booked can be a point in that range.

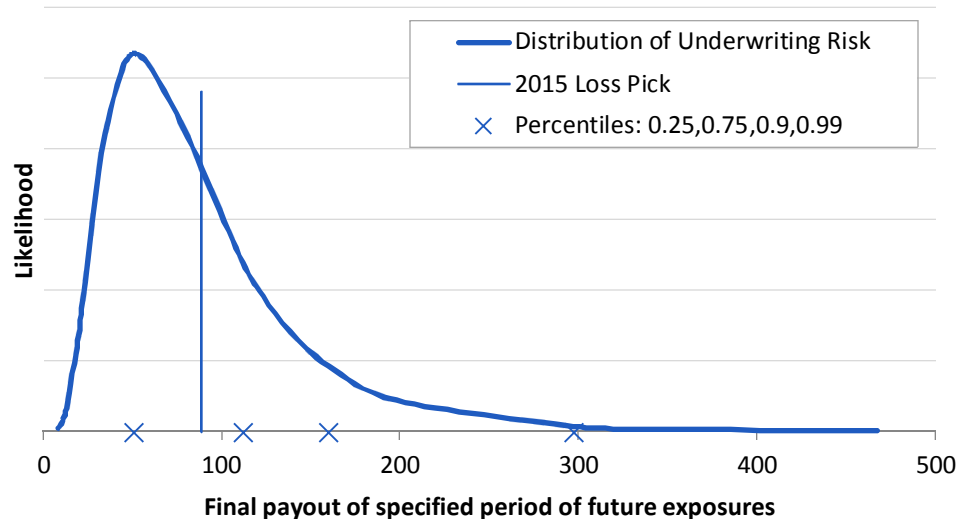
25%ile	29,133
75%ile	47,145
Booked	44,000
Redundancy	4,503

Under **SII and proposed IFRS** reserving you'd use the distribution and, a payout pattern, interest rates, capital loads and a cost of capital to produce a best estimate and a risk margin.

Best Est.	39,497
Discount	-4,568
Risk Margin	6,395
Booked	41,324



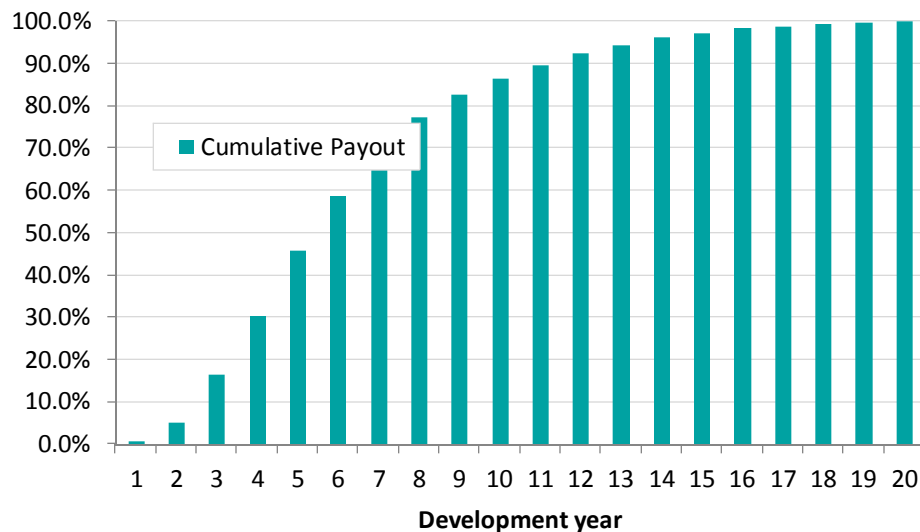
# An ERM view of Underwriting Risk



Usually represents the distribution of ultimate claims costs for 1 future exposure period. I.e. the distribution of ultimate losses from 1 new year of written business.

? How does the model interact with the company's budget process:

- Does the model tied to budget?
- Budget ties to model?
- Some interactive conversation?



In a multiyear projection model using these parameters the emergence of the underwriting risk will replace the reserve risk.

Some questions you'll need to answer are:

- ? Is my underwriting risk *correlated* to my reserve risk?
- ? What will the *reserve balance projection* look like ?
- ? Should we recognize *all* the risk up front or try to capture it as it would emerge in financial statements?

# Some thoughts on Operational Risk

“...investigations of the major financial disasters over the past two decades have identified operational risk issues as the main culprits in the majority of cases.”

[L] p237

## The risk register comes in many forms

Event	Probability	Severity
Embezzlement	Low	Low
Theft of personal data	Low	Medium
Business Interruption	Medium	Medium
Loss due to failure of legal advisors	High	Low
Reputational damage	Low	High
Parent company impairment	Low	Medium

## Quantifying Op Risk

- Quantitative = f(Qualitative)
  - Use ranges rather than point estimates
  - Watch for correlations
- Beware of double counting
  - Historical loss data already includes higher losses due to mispricing
  - Events that show up as losses can arguably be called underwriting risk and are included in the loss experience that makes up your underwriting risk
- People will ask where the numbers came from!!

# Other thoughts on bringing the model together

- Incoming reserves runoff and are replaced by reserves on simulated future periods
- Capture correlations between underwriting periods
- Develop an idea of a reasonable future projection based on high-level assumptions *before* you build detailed parameters
- Will you produce income statements and balance sheets?
- What other projections will your results be compared to?
  - Consultants?
  - Finance department?
  - Investment managers?
  - Rating agencies?
- What other metrics are already most commonly reviewed by management? Have you included those? Have you calibrated to those? Should you?

