

# HOW CAN WE MOVE TO STOCHASTIC ANALYSES?

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# Building & Maintaining STOCH Models

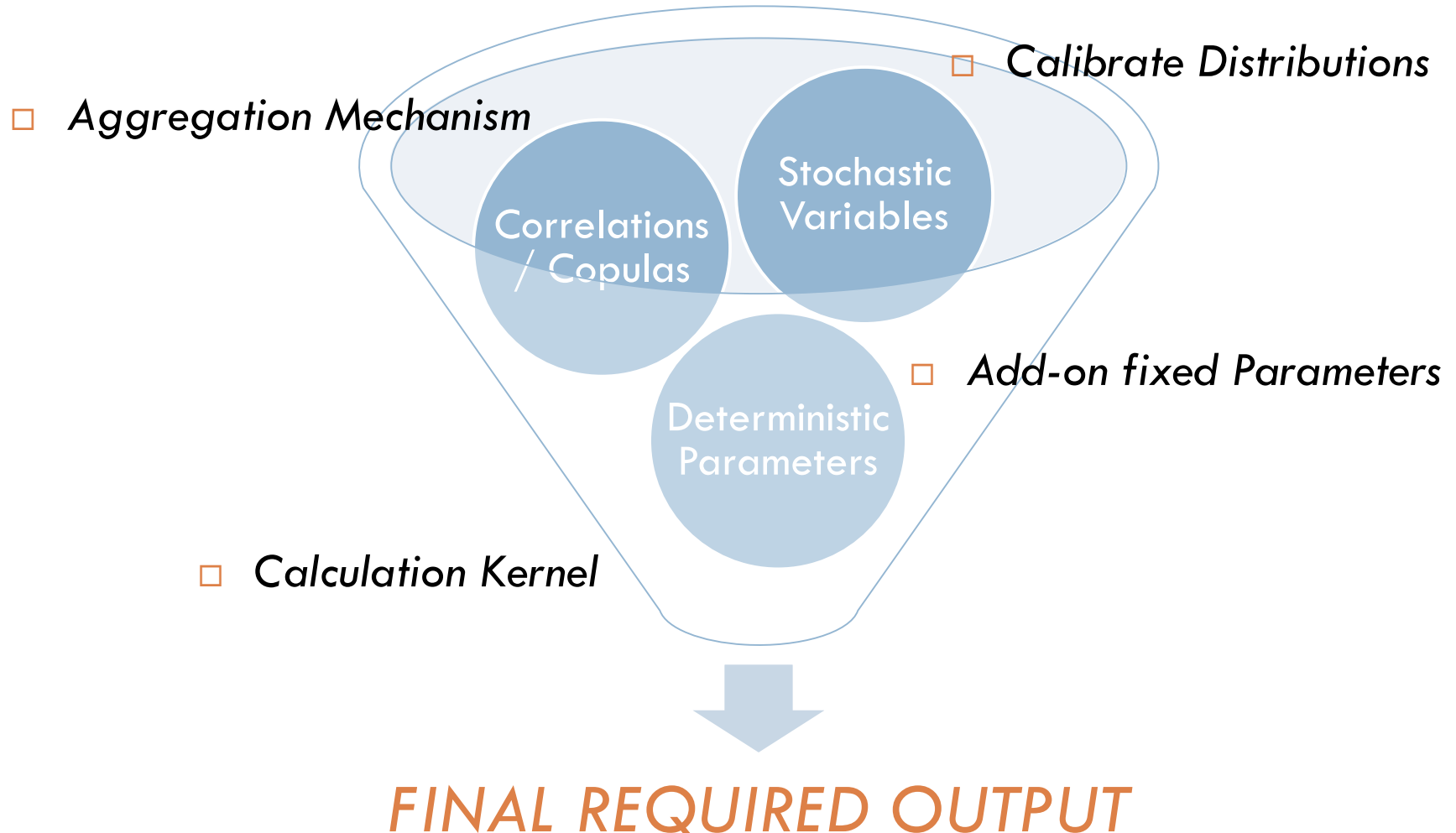
- *Introduction*
- *Building the Model*
- *All you NEED...*

# Stochastic Models

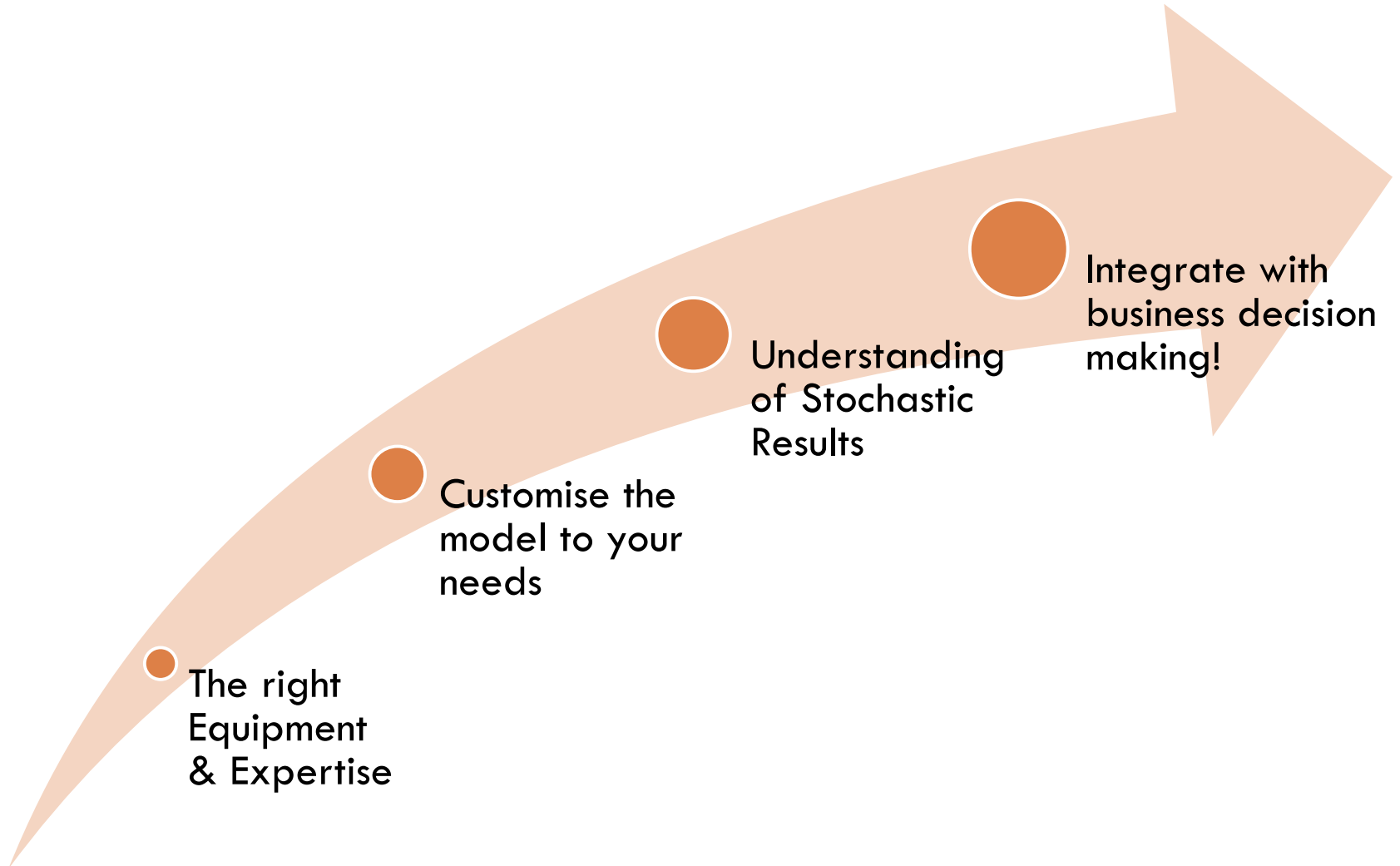
>> 10s of 1000s of simulations as opposed to 10s of deterministic scenarios...  
 >> More statistical analyses, more **INSIGHTS!**

SIMULATIONS	Premium	Losses	Expenses	Investments	Defaults	...	...	Δ Net Assets
1	1,091	588	291	150	7			355
2	1,035	605	214	245	5			455
3	1,065	685	247	103	6			230
4	1,061	767	208	(87)	1			(2)
5	1,037	478	223	225	9			552
6	1,056	1,122	253	(164)	10			(493)
7	1,082	674	219	61	3			248
8	1,030	889	276	(223)	3			(360)
9	1,060	681	290	225	7			306
10	1,036	542	255	186	7			417
11	1,045	970	292	212	10			(15)
12	1,058	1,138	267	(69)	7			(424)
13	1,091	938	233	206	5			121
14	1,065	672	235	135	5			287
15	1,008	630	210	(13)	8			148
16	1,060	886	237	1	6			(68)
17	1,007	840	217	157	2			106
18	1,072	654	297	110	6			225
19	1,092	470	276	222	6			561
20	1,074	916	293	(71)	6			(212)
21	1,068	533	222	241	1			553
22	1,042	558	254	84	5			309
23	1,091	458	259	(88)	1			285
24	1,069	708	243	248	3			362
25	1,014	501	221	197	5			484
.	.	.	.	.	.			.
.	.	.	.	.	.			.
.	.	.	.	.	.			.
10000	1,034	1,122	286	99	1			(276)
<b>Mean</b>	1,055	732	251	92	5			160
<b>St Dev</b>	25	209	30	139	3			308
<b>CoV</b>	2.4%	28.6%	11.8%	150.8%	53.1%			193.0%

# Building the Model



# All you NEED...



# The Business Application...

- *Economic Capital Required*
- *Enterprise Risk Management*
- *Return on Shareholder Capital*
- *Business Planning / Budgeting*
- *Reinsurance Optimisation*

*and many more...*

# What we do now...



## GENERAL INSURER

- *Motor*
- *Property*
- *Liability*

## DETERMINISTIC ANALYSES

- *Best Estimate Reserves*
- *Single Point Risk Premiums*
- *Select Risk Scenario Analysis*



# STOCHASTIC ANALYSES...

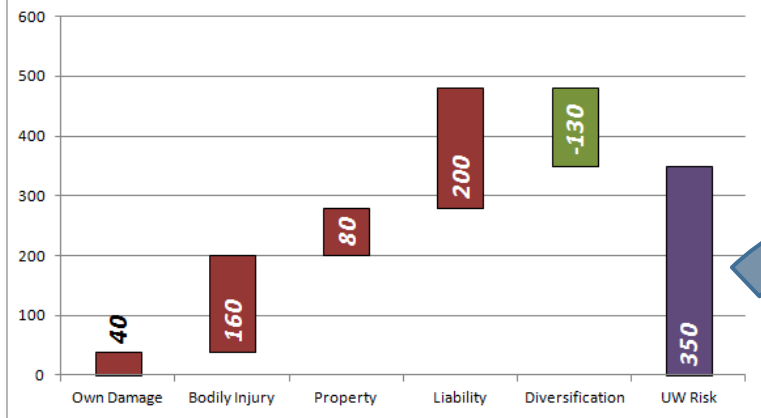
*What more can we do?*





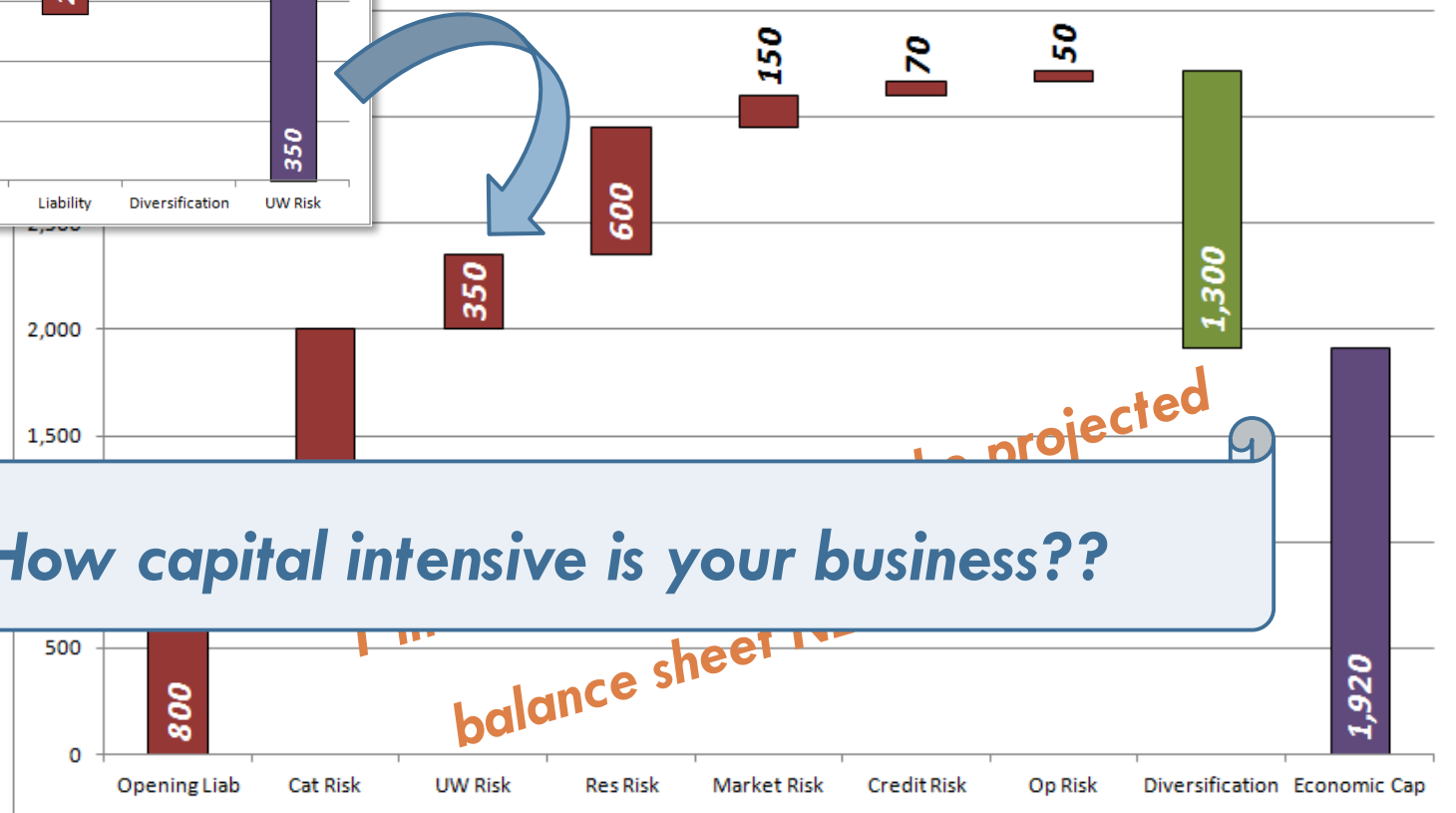
# Economic Capital Calculation

UW Risk by Line of Business



*INSIGHTS into extreme unforeseen events!*

What Constitutes Your Capital?

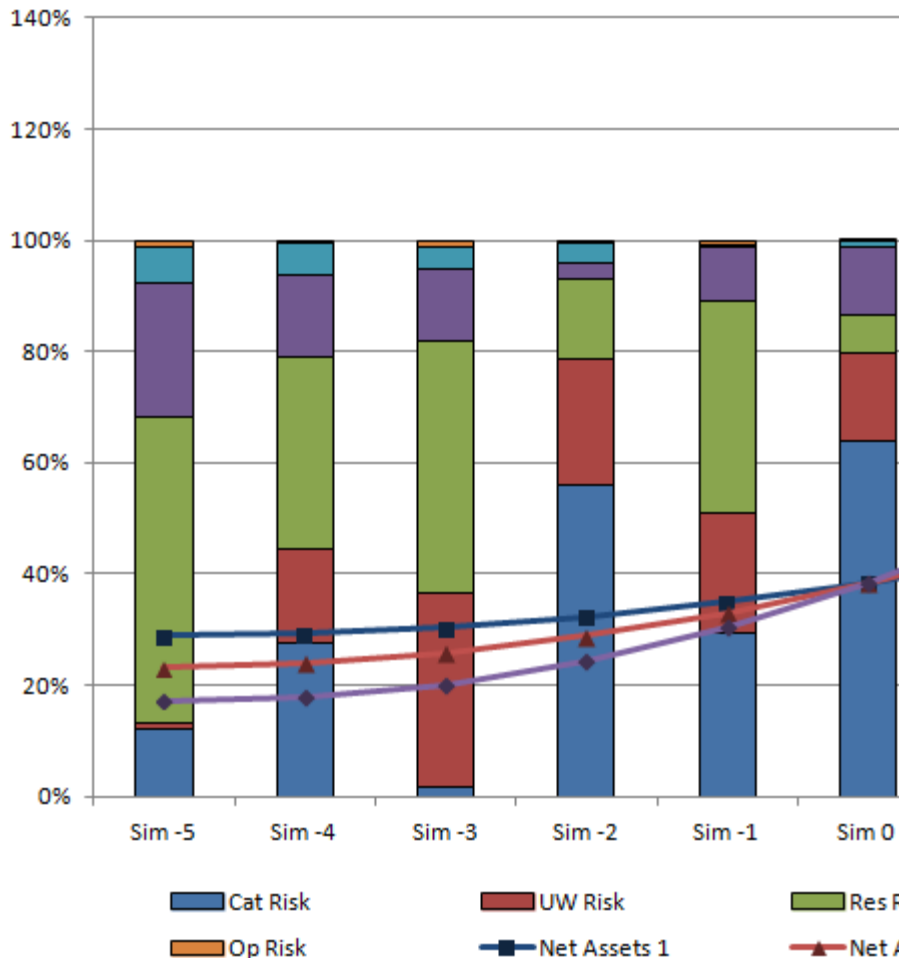


*How capital intensive is your business??*

*balance sheet*

# Enterprise Risk Management

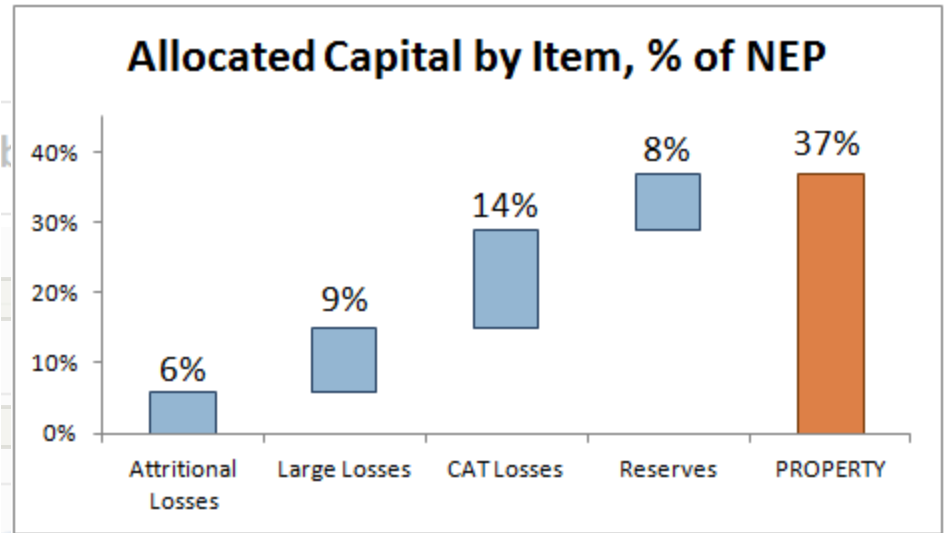
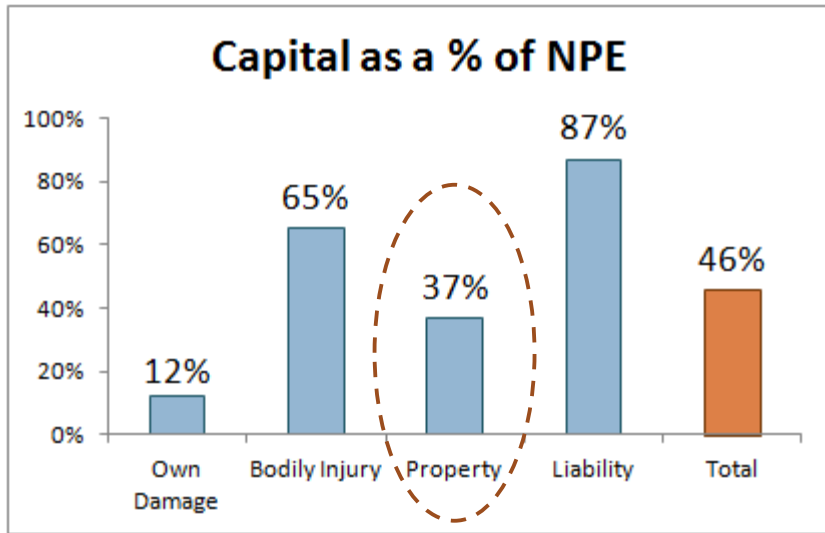
What are your RISK SCENARIOS??



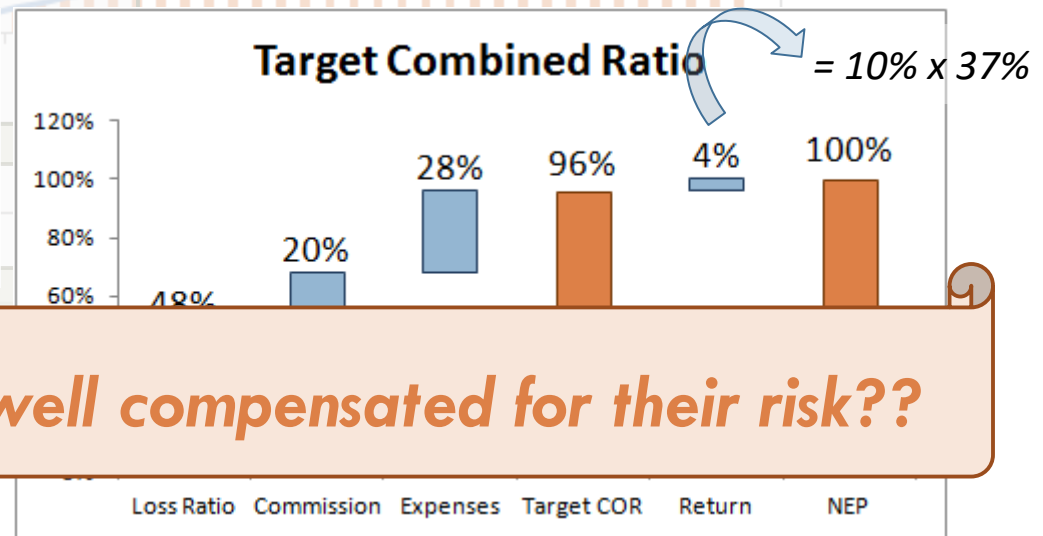
## KEY CONSIDERATIONS

- *Develop and maintain a risk register*
- *Effectiveness of the risk mitigation strategy*
- *Impact of writing a new line of business*

# Return on Shareholder Capital



*TVaR approach to Allocate Shareholder Capital*



*Are your Shareholders well compensated for their risk??*

# Business Planning / Budgeting

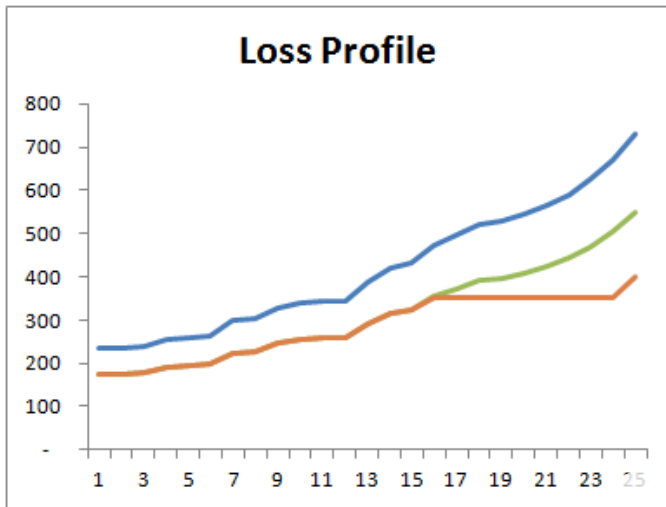
SIMULATIONS	No. of Losses	Event 1	Event 2
1	3	1,030	
2	2	826	
3	2	980	
4	3	820	
5	4	1,082	
6	2	900	
7	2	765	1,
8	4	797	
9	2	1,099	
10	1	1,062	
11	2	373	1,
12	5	631	1,000
13	2	298	
14	3	940	
15	3	457	
16	4	1,092	
17	2	1,008	
18	2	396	1,
19	1	554	
20	2	410	1,
21	-		
22	3	741	
23	3	582	
24	3	600	1,
25	5	560	755

No. of Expected Losses by Band				
	\$100k - \$500k	\$500k-\$1m	\$1m-\$5m	>\$5m
<b>Own Damage</b>	5.4	2.8	0.6	0.1
<b>Bodily Injury</b>	8.3	6.1	3.6	1.4
<b>Property</b>	6.7	3.9	2.2	1.5
<b>Liability</b>	3.3	2.7	1.2	0.3
<b>Total</b>	<b>23.7</b>	<b>15.5</b>	<b>7.6</b>	<b>3.3</b>

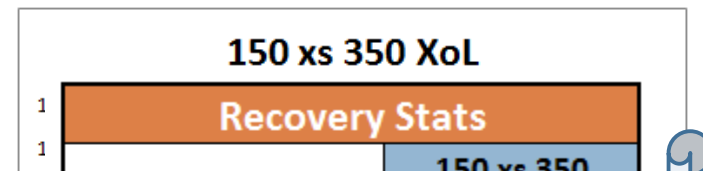
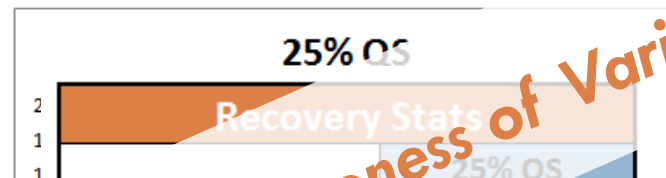
Expected Cost per Claim by Band				
	\$100k - \$500k	\$500k-\$1m	\$1m-\$5m	>\$5m
<b>Own Damage</b>	180	645	2,165	5,140
<b>Bodily Injury</b>	350	834	3,165	6,189
<b>Property</b>	275	774	4,387	8,190
<b>Liability</b>	248	610	2,870	7,345
<b>Total</b>	<b>276</b>	<b>746</b>	<b>3,393</b>	<b>7,172</b>

*Application in Large/CAT Losses, LRs, prudence loadings*

# Reinsurance Optimisation



Loss Profile - Impact of RI			
	Gross Loss	Net of 25% QS	Net of 150 vs 350 XoL
Average	417	313	283
St Dev	149	112	72
CoV	35.5%	35.8%	25.5%



**Which reinsurance covers BEST suit your needs??**

Prob (Recov)	100.0%
Prob (Break-even)	32.0%

Prob (Recov)	40.0%
Prob (Break-even)	24.0%

# A Word of CAUTION!

*The model is part of the decision process; it is NOT the decision...!*

# BEWARE!

CALIBRATING DISTRIBUTIONS &  
CORRELATIONS

EVENTS NOT IN  
DATA

PARAMETER ERROR

MODEL ERROR

## SPURIOUS ACCURACY

PROCESS ERROR

MULTIPLE  
CONCLUSIONS

INTERPRETATION  
OF RESULTS

MODEL  
LIMITATIONS

# Informing the Answer, Not Providing it

*BUT, and it's a BIG but, we never will get to a point where we can say with absolute certainty that this is "the" correct result. Therefore models only advise, models must never decide. Intelligent humans, who understand the models and the business context they operate in, should use them to help make a business call, be it "should I write this risk?", "should I buy this reinsurance cover?" or "should I invest in this stock?"*

***The model is a part of the decision process; it is not the decision.***



# Summary

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*Venturing into stochastic modelling may seem like a big leap, however, the overall business application is manifold!*

*Insights into unforeseen business scenarios ...*

*help you be better prepared for the future and adopt ...*

*appropriate and optimum risk management measures.*

*Use the results as a guide to informed decision making!*

# Thank You

*Please feel free to reach out for any queries:*

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