

# Non-Traditional Risk Transfer

CAE Spring 2015 Meeting

Martin Hanek,  
CGD Rüslikon, 5<sup>th</sup> June 2015



Allianz 

# Agenda

- 1 Allianz Group
- 2 Allianz Risk Transfer (ART)
- 3 ART Business Segments / Deal Examples
- 4 Pricing / Structuring
- 5 Portfolio Management / Reserving

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# Allianz Group











## Allianz SE 2014 Results

- Over 85 million Allianz customers and 147k employees
  - Strong results across all business segments
  - Operating profit grew 3% to €10.4bn
  - Revenues rose 10.4% to a new high of €122.3bn
  - Net income attributable to shareholders rises 3.8% to €6.2bn
  - P&C business: Operating profit climbed to €5.4bn and GWP were €48.3bn
  - L&H business: Operating profit increased 23% to €3.3bn
  - Shareholder's Equity rose to €60.7bn with solvency ratio at 181% and Solvency II at 191%.
  - Allianz SE maintains its strong financial ratings
- Number 1 in P&C business globally
  - Number 3 in Life business worldwide
  - Number 1 in Credit insurance globally
  - One of the leading Asset Managers globally
  - Among highest rated global P&C insurers in the world
  - Among global Top 3 insurers based on market capitalization

# Allianz Global Corporate & Specialty (AGCS)

AGCS is one of the few specialist corporate insurers with a genuine global market presence who can provide “one carrier” insurance solutions across the whole spectrum of corporate and specialty risks.

- Diversified product portfolio
- Wide range of complementary services, including specialist non-traditional risk transfer solutions provided by ART
- Financial strength: €5.4 billion GWP (2014)\*
- Global reach: Integrated in the Allianz network of more than 160 countries worldwide
- Extensive international experience: Manages some 2,000 International Insurance Programs
- More than 3,500 dedicated employees

Product lines	
Alternative Risk Transfer 	Aviation 
Energy 	Engineering / Construction 
Financial Lines 	Global Programs 
Liability / Casualty 	Marine 
Property 	Risk Consulting 

\*All AGCS companies

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# Allianz Risk Transfer (ART)



## ART key facts

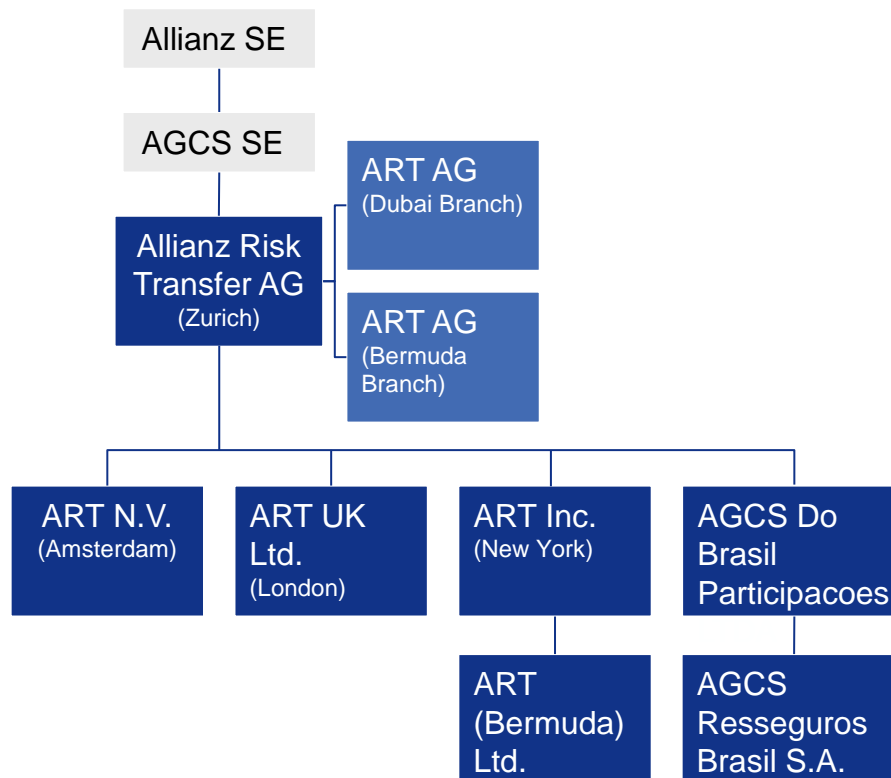
- Founded in June 1997
- Integration into AGCS in 2011
- Staff of around 95 employees
- Center of competence for risk solutions
- ART Zurich conducts business on behalf of AGCS, Allianz Re and its own ART business
- Special reinsurance solutions support for Allianz Group entities

## Board of Directors of ART Zurich

**Chris Fischer Hirs**, Chairman  
**Amer Ahmed**, Director  
**Doug Pennycuick**, Director  
**Thomas C. Wilson**, Director

# ART Structure and Financials

## Structure

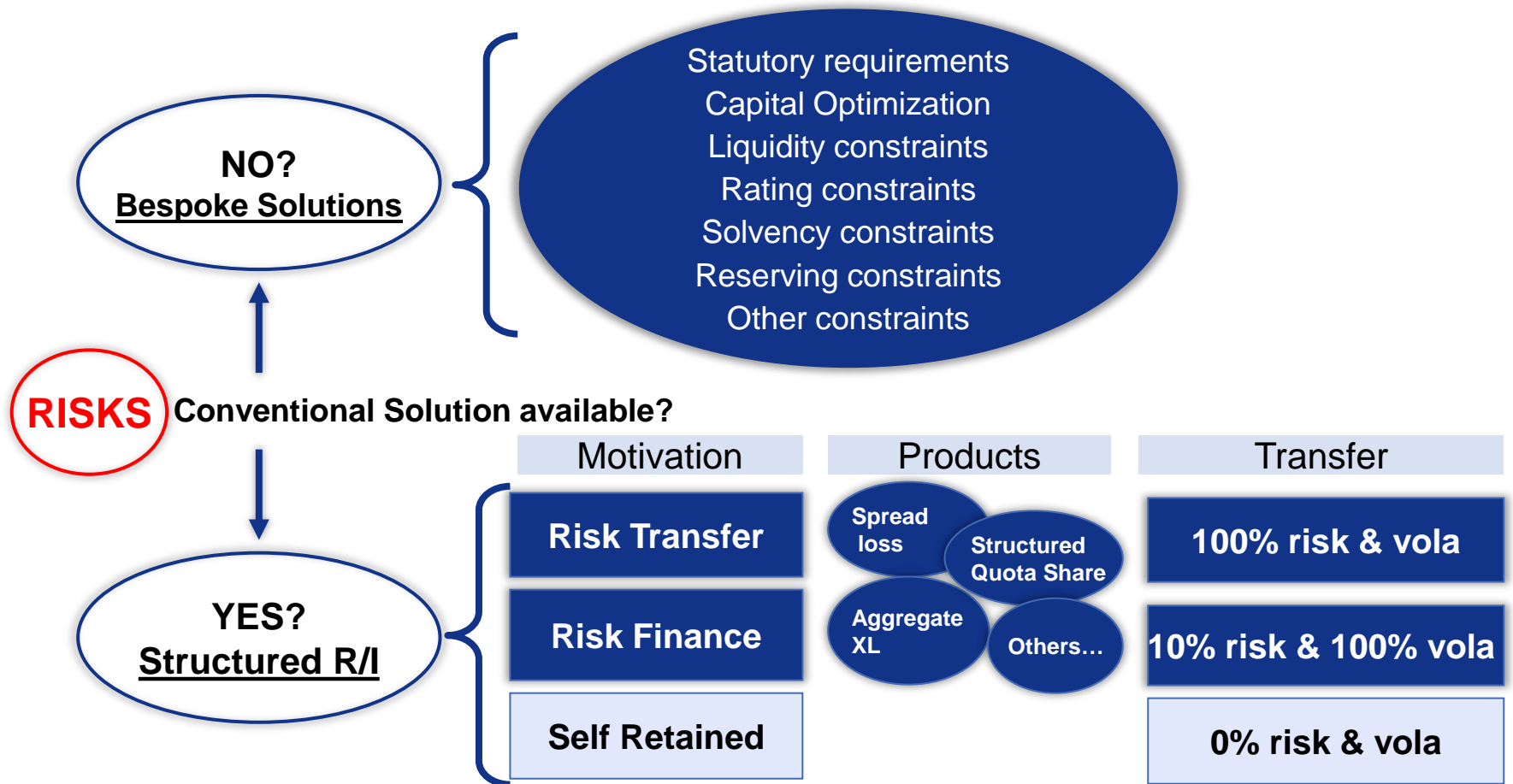


## Financials 2014

in EUR k	12 2014
Gross Written Premium	1'133'085
Premiums Earned Net	298'066
Claims and insurance benefits	-188'256
Acquisition costs and administration expenses	-66'769
<b>Underwriting income</b>	<b>43'041</b>
Investment result (Corporate + ART Deals) / others	31'988
<b>Operating profit</b>	<b>75'029</b>
Realized gains&losses / others	-1'682
Income Taxes	-15'056
<b>Net income</b>	<b>58'291</b>
Expense Ratio (Acq costs & admin exps / NPE)	22.4%
Claims Ratio (Claims and insurance benefits/NPE)	63.2%
Combined Ratio	85.6%



# Structured (Re)-Insurance & Bespoke Solutions



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# ART's Core Business Segments

## Corporate Solutions

- ✓ Bespoke products for corporate and captive clients
- ✓ Coverage and rates are locked in over multiple years
- ✓ Transfer of underwriting and financial timing risk
- ✓ Ability to share in the positive outcome over the term
- ✓ Strong cooperation with AGCS

## Climate Solutions

- ✓ Customized weather insurance products
- ✓ Typically based on a weather index (i.e. wind chill, temperature, rainfall)
- ✓ Crop re-/insurance
- ✓ Single- or Multi-year
- ✓ Can combine with other segments

## Reinsurance Solutions

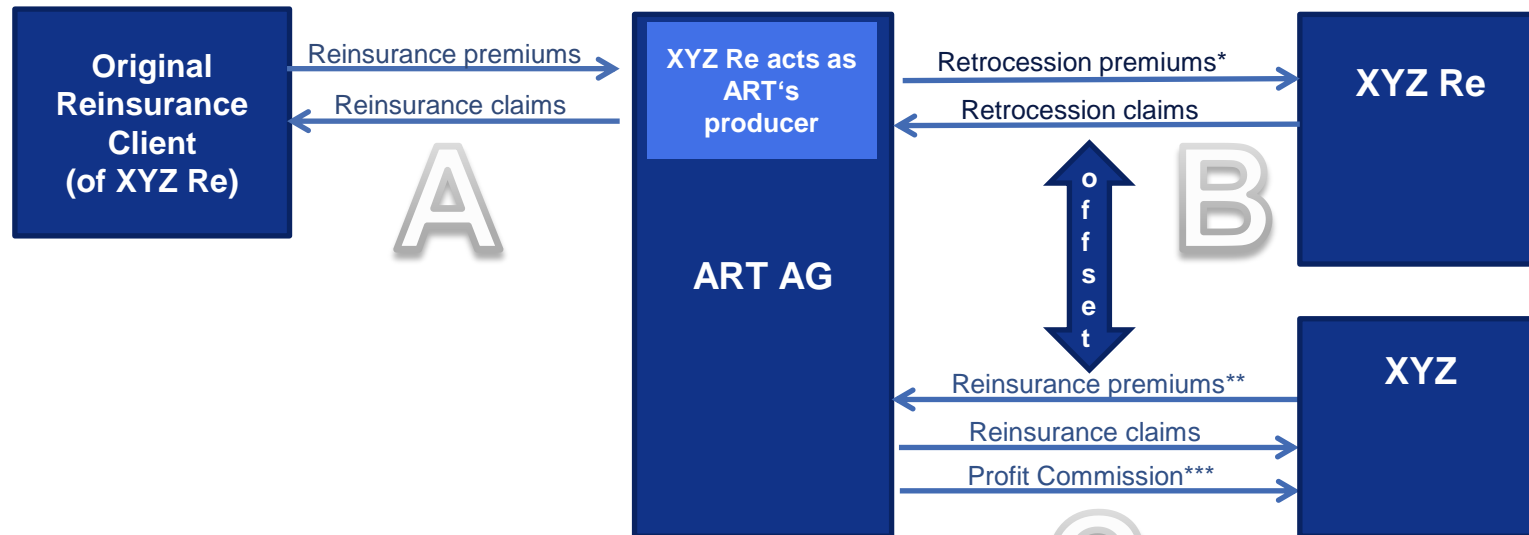
- ✓ Bespoke products for insurance company clients
- ✓ Coverage and rates are locked in over multiple years
- ✓ Transfer of underwriting and financial timing risk
- ✓ Ability to share in the positive outcome over the term
- ✓ Brokered or direct
- ✓ Collaboration with Allianz Re

## Insurance Linked Markets

- ✓ Connects insurance to the capital markets
- ✓ Transforms event-driven insurance risk into investment products (i.e. catastrophe bonds)
- ✓ Allianz as an investor/reinsurer/leverage provider/structurer

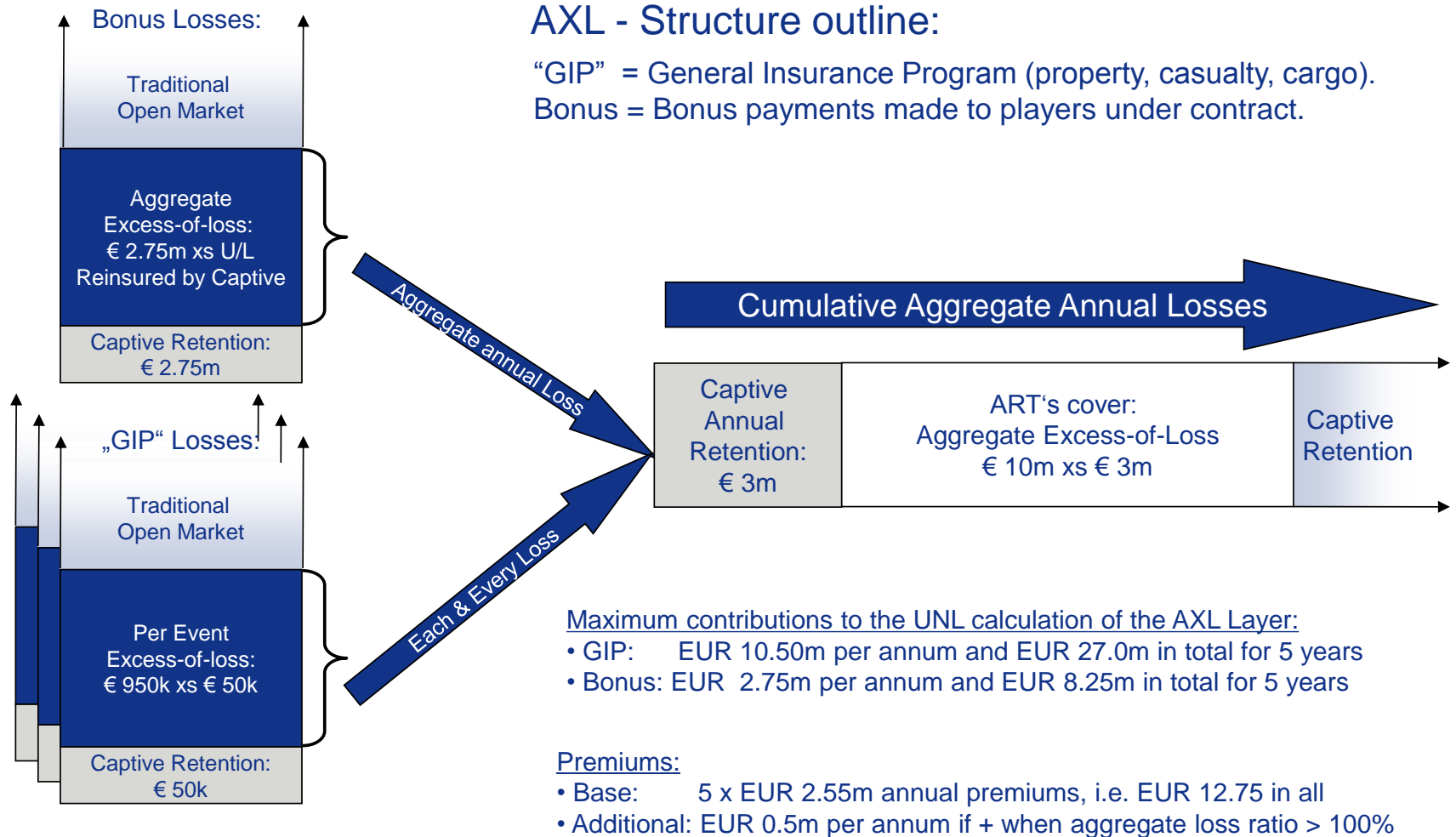
# Reinsurance Solutions – Reinsurer downgrade protection

- Issue: open market reinsurer facing downgrade and subsequent loss of business as a result of a sovereign downgrade
- Solution: ART gives cedants option to front the reinsurance portfolio while mitigating its credit risk by writing a large stable QS and withholding commission as a collateral for potential default



- A** Based on a Contingent Discretionary Underwriting Agreement.
- B** Based on a Contingent 100% Quota-Share Retrocession Contract.
- C** Based on a Personal Lines Quota-Share Reinsurance Agreement.

# Corporate Solutions – Sports article manufacturer reinsurance



# Corporate Solutions – 1<sup>st</sup> Tier automotive supplier

Pay-on-production creates short term P&L risks



Premium  
Class:



Comfort  
Class:



Compact  
Class:



Structure:

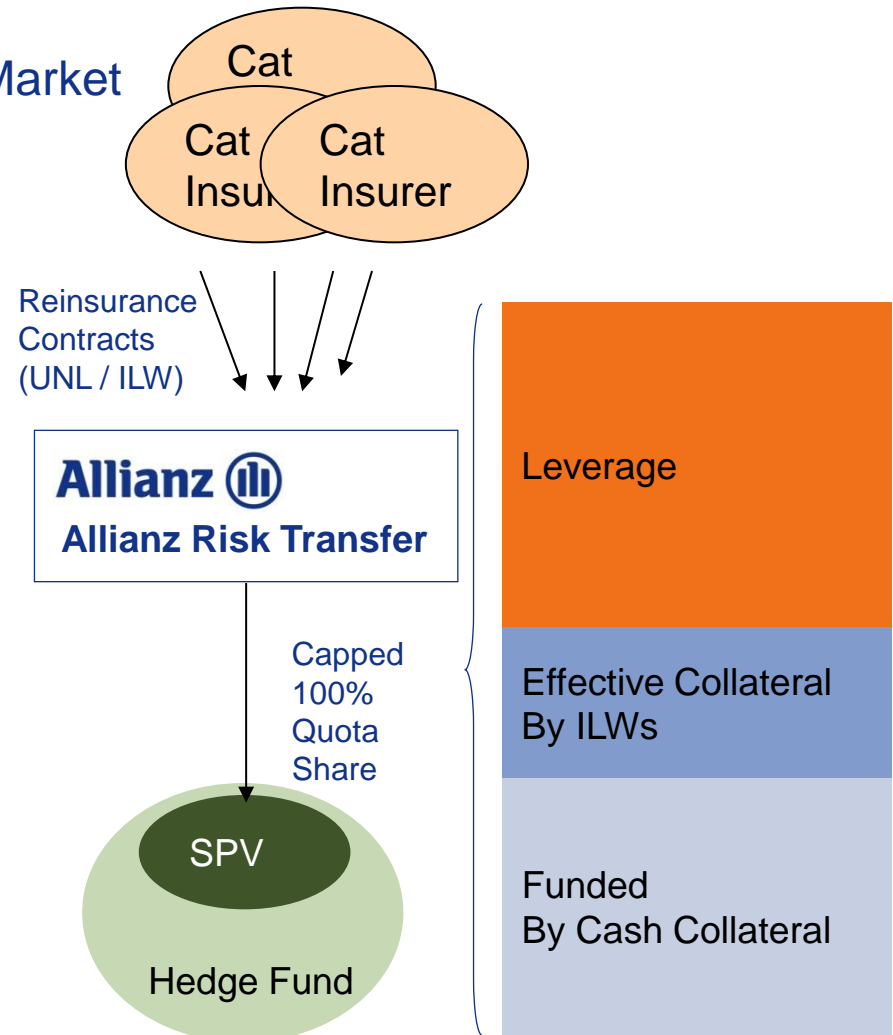
BMW 7 series € 20m	Audi A8 € 20m	Merc S series € 20m
BMW 5 series € 15m	Audi A6 € 15m	Merc E series € 15m
BMW 1 & 3 € 15m	Audi A3 & A4 € 15m	Merc A & B € 15m

Per Brand Sublimit:	€ 30m
Per Class Sublimit:	€ 30m
Total Sum Insured:	€ 60m
Period:	5 Years
Annual Premium:	€ 7m

# Insurance Linked Markets Example

## Investor Access to Cat Re-/Insurance Market

- ART writes portfolio of US cat reinsurance and cedes it to special purpose vehicle via capped quota share.
- Quota share limit is above 100% of gross modeled loss of portfolio (max(AIR, RMS)).
- Collateral as security under the quota share:
  - cash collateral in the amount of 100% net modeled loss
  - additional collateral in form of reinsurance (ILWs)
- ART participates in margin on reinsurance contracts, charge for leverage provided and profit commission



# Climate Solutions



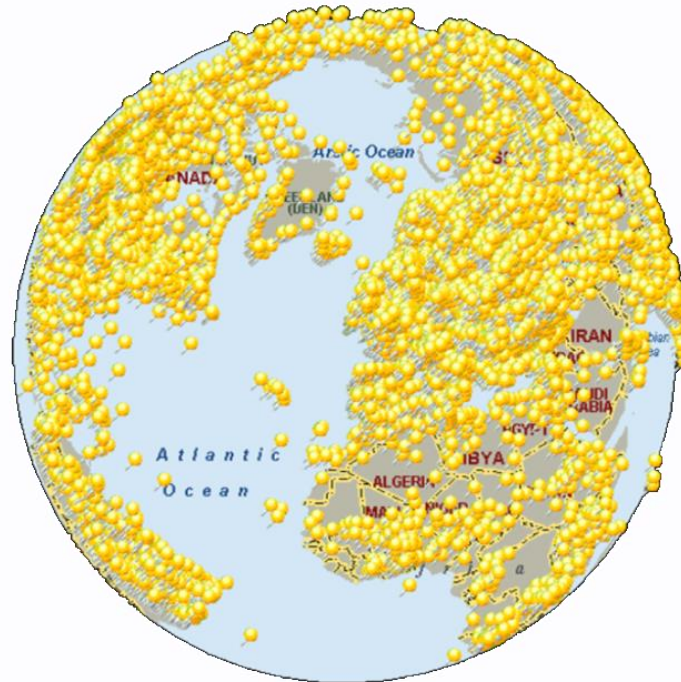
*“Everybody talks about the weather, but nobody does anything about it.”*

Mark Twain (1835–1910)

## Weather is volatile



## Weather is data



## Weather is business



*“Climate is what we expect, weather is what we get.”*



# Climate Solutions Examples

## Rain

- Lack or excess of rain can severely impact hydro power generation and agriculture yields
- Other sectors affected by rain are construction, mining, travel, retail, leisure, and entertainment
- **ART solution:**
  - Lack of rain cover for hydro generators and farmers
  - Excess rain protection for mining and construction



## Wind

- On- and off-shore wind farm operators and capital providers depend on steady wind
- Too much or too little wind impairs energy production
- Too much wind delays off-shore construction
- **ART solution:**
  - Solutions can cover lack of wind or volatility, increasing credit quality, often over multiple years
  - Excess wind covers are also sold during construction



## Snow

- Retail, aviation, municipalities, and transportation companies incur significant costs for snow removal, less customer traffic and cancellations, sometimes around major holidays
- Electric utilities, telephone, cable providers experience damage to their systems from storms
- Ski tourism suffers from lack of snow
- **ART solution:**
  - Critical day product to cover heavy snow
  - Winter sport resorts, equipment, clothing and snow removal companies protect against mild winters



## Temperature

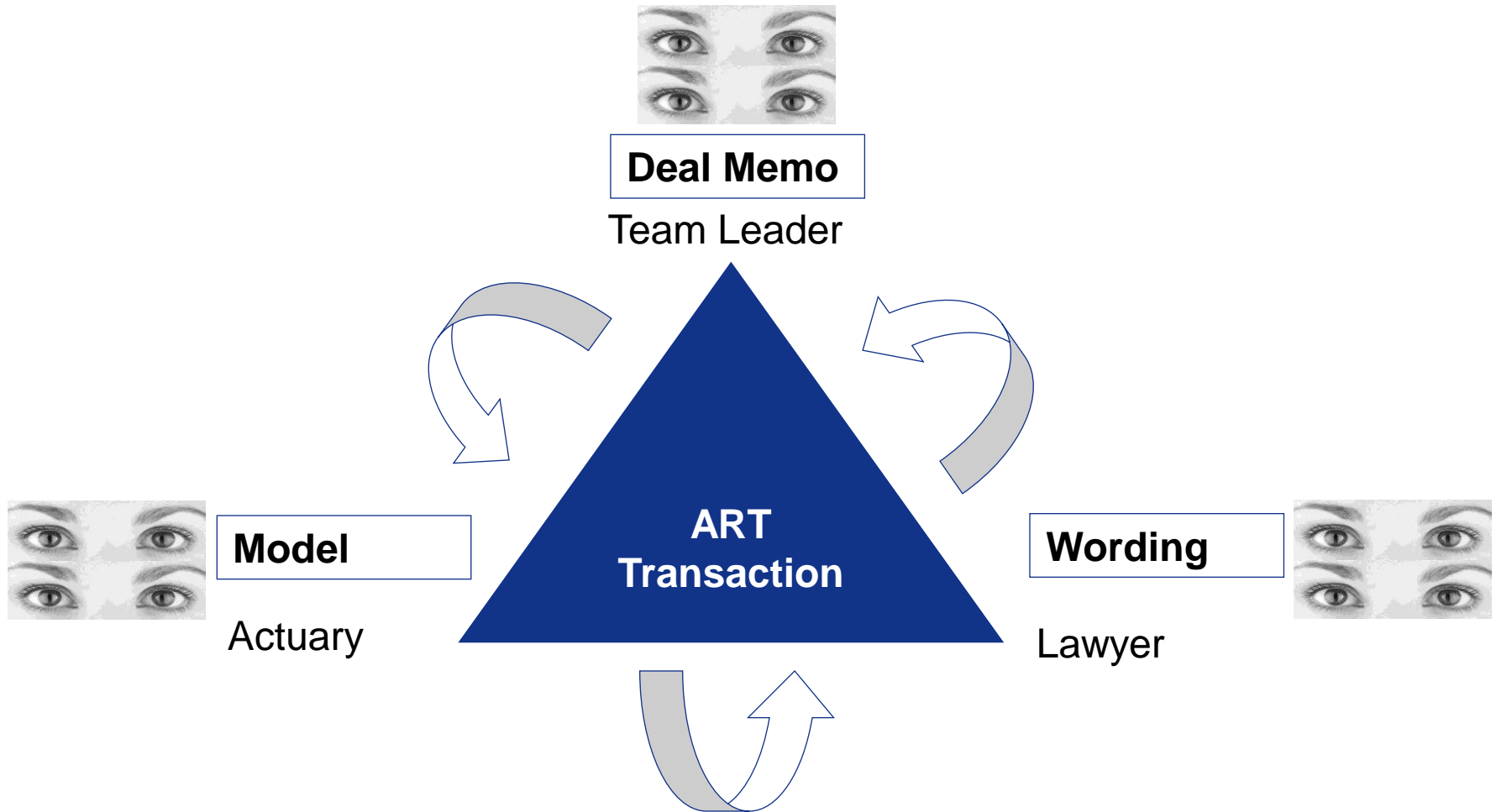
- Crop is sensitive to late frost and excess heat
- Energy and construction companies are impacted
- Seasonal retail products, food and beverage sales are influenced by heat and cold
- **ART solution:**
  - Tailored crop solutions combine temp and rain
  - Protect against warm winters and cool summers, typically achieved with HDD and CDD deals



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# Multiple Sign-Offs are part of the Underwriting Process



In addition: Finance & accounting sign-off, compliance tests (financial crimes risk assessment), overall executive sign-off

## “Structuary”

- Underwriters/Structurers rather than Pricing Actuaries
- Work in multi-disciplinary deal teams
- Every deal is different – be flexible
- Multiple deals at the same time, low hit ratio
- Iterate:
  - Obtain data
  - Analyze, decide on modelling granularity
  - Build model of structure
  - Renegotiate/restructure

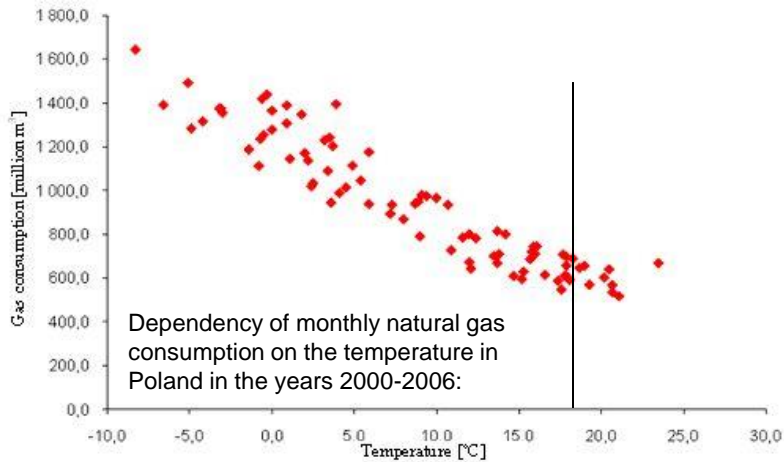


### Differences to traditional pricing:

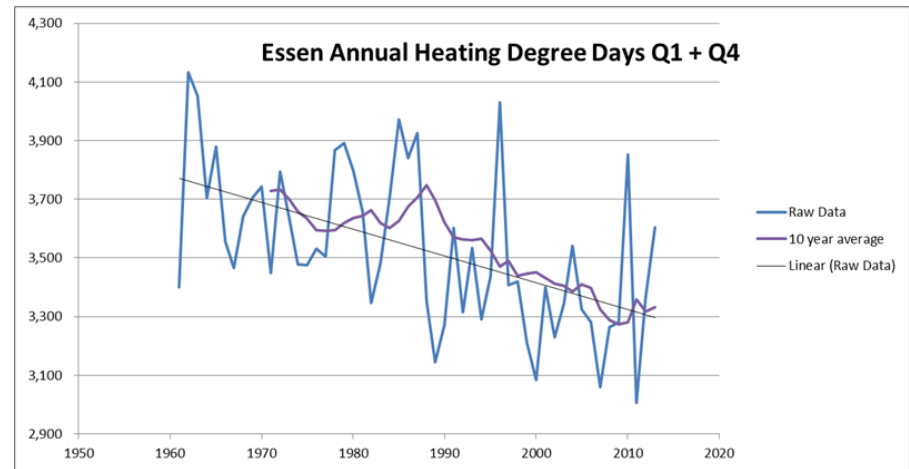
- No single LoB knowledge/focus
- Iterative process rather than linear
- Consider value/benefit to client rather than Cost+ approach
- Valuing options & structure important
- Complex output – cashflows, accounting
- Build a portfolio model = capital model input

# Climate Solutions Example

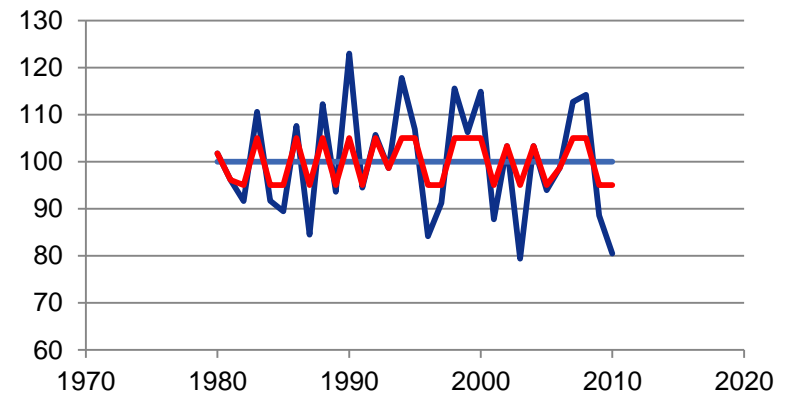
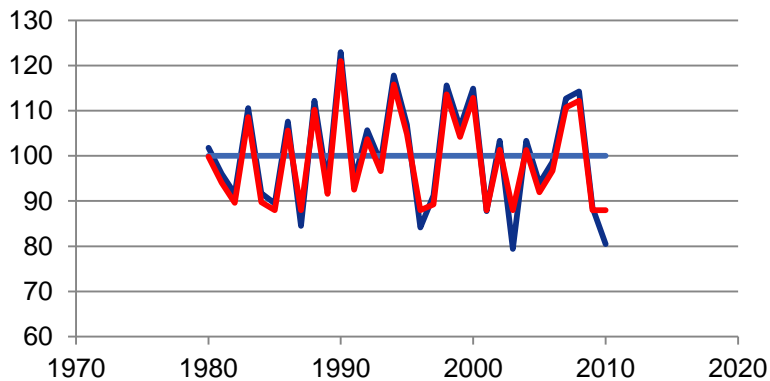
## 1) Identify business issue & weather dependence



## 2) Approximate by an index



## 3) Decide on desired level of protection-extreme or frequent, long or short duration,...

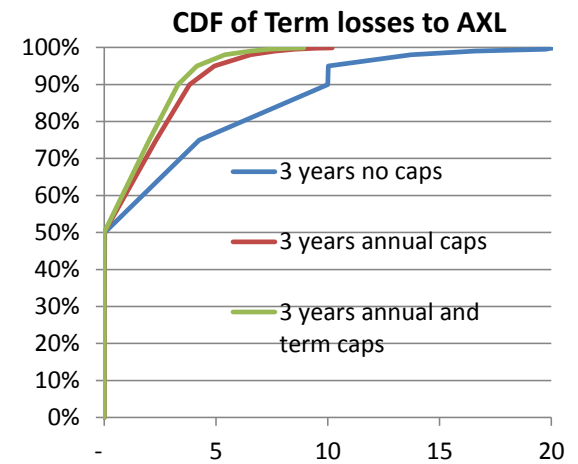
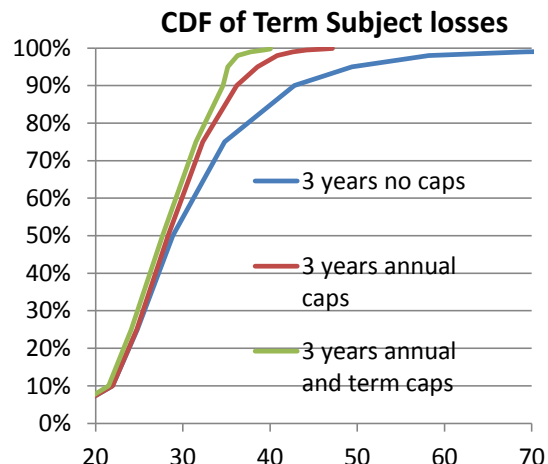
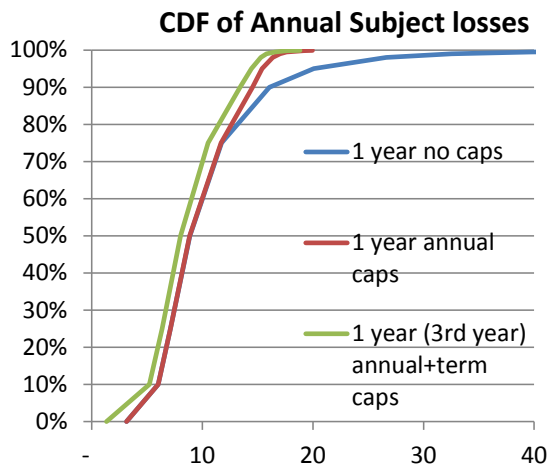


# Structuring Example (1)

- Captive with 3 lines of business is seeking a stop loss protection 10x12.5 of annual losses

- 1) 1 year AXL 10x15
- 2) 3 independent years of transaction 1)
- 3) 3 years with subject losses in A,B,C capped with **annual caps**
- 4) 3 years with subject losses capped by **annual+term caps**

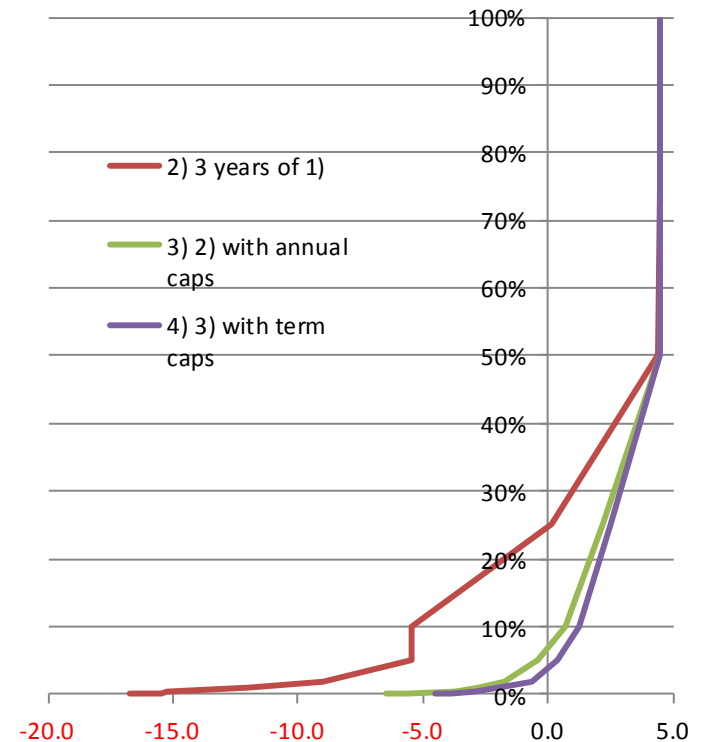
Line	Mean	STDEV	Annual cap	Term cap
A	5	5	10	20
B	5	1	7.5	15
C	0.5	20	5	10
A+B+C			22.5	45
<b>Agg XL</b>				
Annual Limit			10	20
attachment			12.5	



# Structuring Example (2)

- Loss mitigation through sublimits allows for improved profitability / reduction of premium

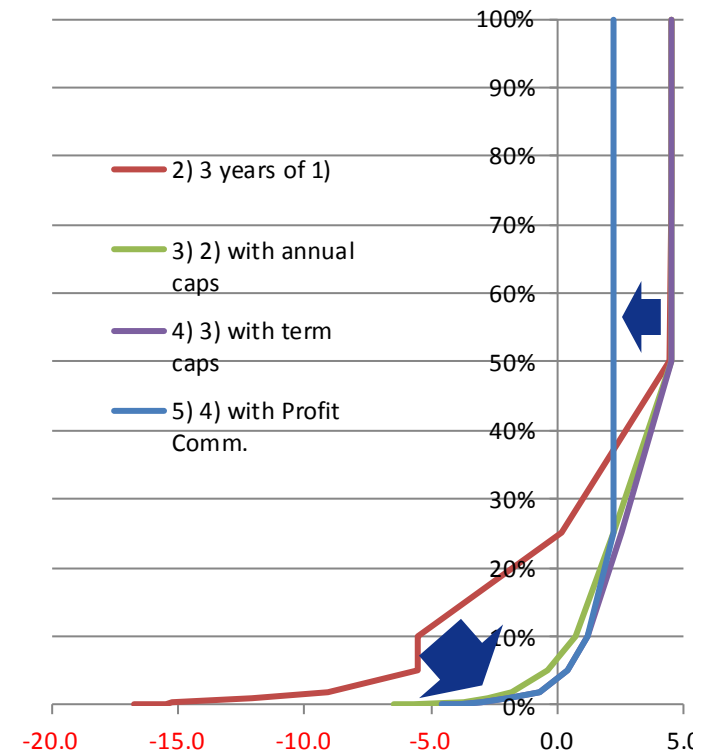
	1) 1 year AXL	2) 3 years of 1)	3) 2) with annual caps	4) 3) with term caps F
Annual Premium	1.5	1.5	1.5	1.5
Mean Result	0.6	1.8	3.2	3.4
Exp(+)/Exp(-)	1.9	2.6	34.7	69.3
Expected LR	60.0%	60.2%	28.5%	24.1%
0.1%	-8.5	-16.7	-6.5	-4.6
0.2%	-8.5	-15.5	-5.7	-3.9
0.5%	-8.5	-15.2	-3.7	-3.0
1.0%	-8.5	-12.0	-2.8	-2.0
2.0%	-8.5	-9.0	-1.8	-0.7
5.0%	-5.9	-5.5	-0.4	0.4
10.0%	-2.0	-5.5	0.7	1.2
25.0%	1.5	0.1	2.2	2.5
50.0%	1.5	4.4	4.5	4.5
75.0%	1.5	4.5	4.5	4.5
90.0%	1.5	4.5	4.5	4.5
100.0%	1.5	4.5	4.5	4.5



# Structuring Example (3)

- Or Profit Commission at Expiry (positive balance between 50% of premiums – claims returned)

	1) 1 year AXL	2) 3 years of 1)	3) 2) with annual caps	4) 3) with term caps	5) 4) with Profit Comm.
Annual Premium	1.5	1.5	1.5	1.5	1.5
Mean Result	0.6	1.8	3.2	3.4	2.0
Exp(+)/Exp(-)	1.9	2.6	34.7	69.3	40.3
Expected LR	60.0%	60.2%	28.5%	24.1%	56.3%
0.1%	-8.5	-16.7	-6.5	-4.6	-4.6
0.2%	-8.5	-15.5	-5.7	-3.9	-3.9
0.5%	-8.5	-15.2	-3.7	-3.0	-3.0
1.0%	-8.5	-12.0	-2.8	-2.0	-2.0
2.0%	-8.5	-9.0	-1.8	-0.7	-0.7
5.0%	-5.9	-5.5	-0.4	0.4	0.4
10.0%	-2.0	-5.5	0.7	1.2	1.2
25.0%	1.5	0.1	2.2	2.5	2.3
50.0%	1.5	4.4	4.5	4.5	2.3
75.0%	1.5	4.5	4.5	4.5	2.3
90.0%	1.5	4.5	4.5	4.5	2.3
100.0%	1.5	4.5	4.5	4.5	2.3





# Tools

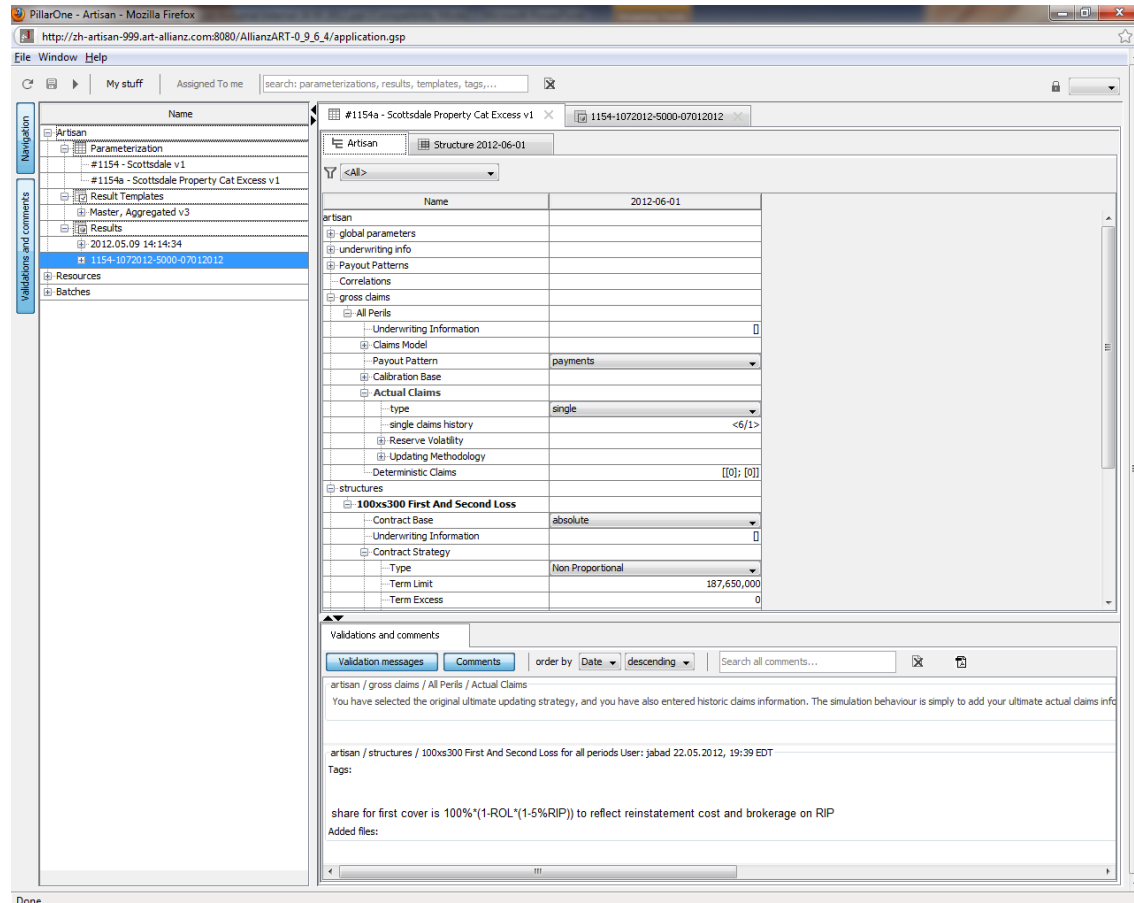
## Analysis & Parametrisation

- Excel
- DB tools-SQL, Access
- Statistical tools - Matlab, R
- Risk Link for RMS

## Intial models –mostly @Risk in Excel

- Flexible, fast
- Structured as Parameters, Loss modelling, structure application, cashflows, Output results

**Portfolio models** – Artisan for P&C deals, Matlab for credit risk or market risk exposed deals, Excel models for remaining deals.



The screenshot shows the Artisan software interface. On the left is a navigation tree with categories like 'Navigation' and 'Validators and comments'. The main area displays a configuration table for a structure named '100xs300 First And Second Loss'.

Name	2012-06-01
artisan	
global parameters	
underwriting info	
Payout Patterns	
Correlations	
gross claims	
All Perils	
Underwriting Information	
Claims Model	
Payout Pattern	payments
Calibration Base	
Actual Claims	
type	single
single claims history	<6/1>
Reserve Volatility	
Updating Methodology	
Deterministic Claims	[[0]; [0]]
structures	
100xs300 First And Second Loss	
Contract Base	absolute
Underwriting Information	
Contract Strategy	
Type	Non Proportional
Term Limit	187,650,000
Term Excess	0

At the bottom, there is a 'Validators and comments' section with tabs for 'Validation messages' and 'Comments'. It shows a comment from 'Jabad' dated 22.05.2012, 19:39 EDT, discussing the reinstatement cost and brokerage on RIP.

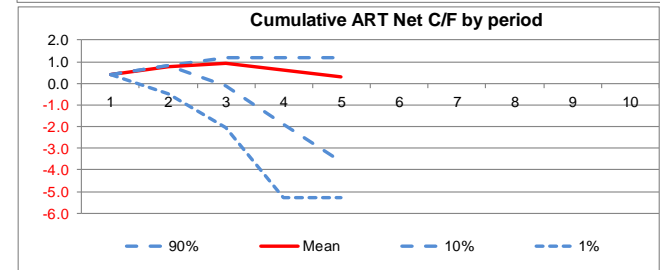
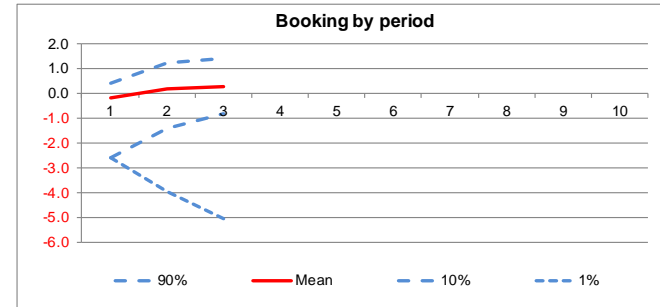
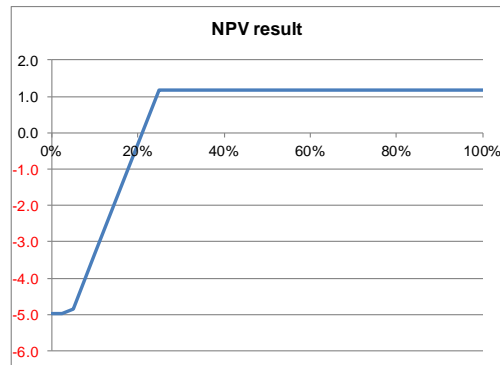
# Output

- Driven by UW system entries, UWC requirements and common sense
- Single deal rather than portfolio impact focus due to the heterogeneity of the portfolio
- Mean result, Probability of loss, Gamma, Percentiles, Nominal/NPV, Accounting, Cashflows

## Simulated result summary for XXX deal in CCY mil for XXX share as of 01/01/1900

	Contract result		Ultimate LR		Ultimate CR		ART Cashflow		Accounting		
	Nominal	NPV	Gross of funding	Net of funding	Gross of funding	Net of funding	Inflow	Outflow	1	2	3
Mean	0.31	0.33	60%	60%	98%	80%	1.5	1.2	-0.2	0.2	0.3
Coeff of Var	652%	564%	64%	225%	14%	168%	0%	168%	679%	573%	555%
Mode	-5.3	-5.0	0%	0%	92%	20%	1.5	0.3	-2.6	-2.6	-0.1
Min	-5.3	-5.0	0%	0%	92%	20%	1.5	0.3	-2.6	-4.0	-5.1
Max	1.2	1.2	133%	433%	135%	453%	1.5	6.8	0.4	3.1	4.5
Prob Result< or LR,CR>100%	18%	18%	17.4%	17.4%	18.5%	18.5%			23%	18%	14%
Gamma	1.5	1.5							0.7	1.6	1.8
Percentile											
0.10%	-5.3	-5.0	133%	433%	135%	453%	1.5	0.3	-2.6	-4.0	-5.1
0.20%	-5.3	-5.0	133%	433%	135%	453%	1.5	0.3	-2.6	-4.0	-5.1
0.50%	-5.3	-5.0	133%	433%	135%	453%	1.5	0.3	-2.6	-4.0	-5.1
1%	-5.3	-5.0	133%	433%	135%	453%	1.5	0.3	-2.6	-3.9	-5.1
2.50%	-5.3	-5.0	133%	433%	135%	453%	1.5	0.3	-2.6	-3.1	-4.8
5%	-5.3	-4.9	133%	433%	135%	453%	1.5	0.3	-2.6	-2.6	-3.7
10%	-3.6	-3.3	122%	321%	124%	341%	1.5	0.3	-2.6	-1.4	-0.8
25%	1.2	1.2	83%	0%	92%	20%	1.5	0.3	0.4	0.4	0.4
50%	1.2	1.2	57%	0%	92%	20%	1.5	0.3	0.4	0.4	0.4
75%	1.2	1.2	29%	0%	92%	20%	1.5	0.3	0.4	0.4	0.4
90%	1.2	1.2	11%	0%	92%	20%	1.5	5.1	0.4	1.2	1.4
100%	1.2	1.2	0%	0%	92%	20%	1.5	6.8	0.4	3.1	4.5

Return on	99th VaR	5.8%	6.7%
	99th TVaR	5.8%	6.7%
	5.3 MUE*	5.8%	6.3%
	realistic MUE (99.9 VaR)	5.8%	6.7%
	30% Risk Capital**	19.3%	20.9%
	2.60 Cat capacity used***	11.8%	12.8%



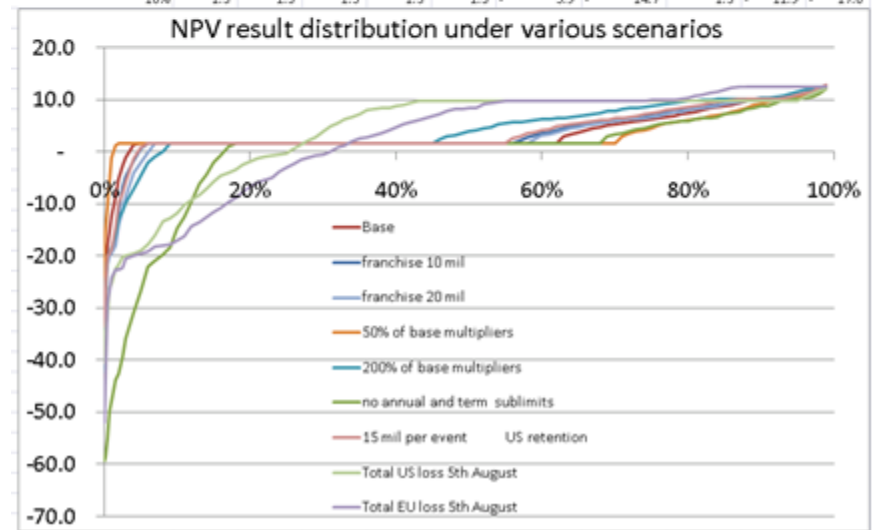
# Stress Testing

- Key part of analysis
- Economics often robust w.r.t. changes in parameters
- Choosing the right stress tests

	Base	franchise 10 mil	franchise 20 mil	50% of base multipliers	200% of base multipliers	Franchise 20 mil, 200% base scaling	no annual and term sublimits	15 mil per event US retention	Total US loss 5th August	Total EU loss 5th August
Mean result	3.5	3.6	3.3	3.2	4.2	2.2	0.4	3.8	4.2	2.6
Prob(Result<0)	3.5%	4.8%	6.1%	1.9%	8.1%	15.7%	0.163	0.048	0.252	0.309
Gamma	12.92	8.15	6.27	30.67	7.06	2.16	0.89	0.81	2.64	1.74
0%	47.3	36.4	38.7	29.2	42.3	46.8	59.3	33.6	40.5	51.9
0.10%	26.3	31.1	35.0	17.7	34.4	46.8	59.3	33.6	40.5	51.9
0.20%	22.0	24.3	29.3	15.1	26.6	43.5	58.5	26.2	34.3	43.6
0.50%	18.1	20.1	21.7	10.6	20.1	32.3	55.0	20.2	31.5	29.1
0.75%	15.2	19.6	19.9	5.5	19.3	29.0	49.9	19.6	26.2	26.7
1%	12.5	18.8	19.5	1.2	18.3	27.9	47.8	18.8	25.4	24.2
1.50%	8.6	16.8	18.0	1.1	16.0	26.4	43.9	14.6	22.4	22.7
2%	5.2	11.5	14.1	1.5	13.0	22.3	42.6	9.9	21.7	22.6
2.50%	2.8	6.9	11.2	1.5	11.3	21.4	39.4	7.9	20.1	22.3
3%	1.1	4.8	8.7	1.5	9.8	19.7	35.9	5.8	20.0	20.6
4%	1.4	1.8	4.0	1.5	7.2	19.2	30.8	1.3	19.6	19.9
5%	1.5	0.5	2.1	1.5	4.6	18.1	26.7	0.7	19.0	19.6
6%	1.5	1.5	0.2	1.5	2.2	14.5	22.0	1.5	17.8	19.1
7%	1.5	1.5	1.5	1.5	0.9	12.6	21.0	1.5	16.1	18.1
8%	1.5	1.5	1.5	1.5	0.1	10.6	19.7	1.5	13.4	18.0
9%	1.5	1.5	1.5	1.5	1.5	9.5	18.4	1.5	12.8	17.7
10%	1.5	1.5	1.5	1.5	1.5	5.9	14.7	1.5	11.9	17.0

Table of results under Cat and non cat scenarios  
PCS cat L+LAE R

	0%	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%
non cat L+LAE R	14.14	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
40%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
44%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
46%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
48%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
50%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
52%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
54%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
56%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
58%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
60%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2
62%	2.7	2.7	2.7	2.7	2.7	2.7	1.8	(0.0)	(0.0)	(0.0)	(0.0)
64%	2.7	2.7	2.7	2.7	2.7	1.8	(0.8)	(2.8)	(2.8)	(2.8)	(2.8)
66%	2.7	2.7	2.7	2.7	1.8	(0.8)	(3.5)	(5.6)	(5.6)	(5.6)	(5.6)
68%	2.7	2.7	2.7	1.8	(0.8)	(3.5)	(6.4)	(7.6)	(7.6)	(7.6)	(7.6)
70%	2.7	2.7	1.8	(0.8)	(3.5)	(6.4)	(7.9)	(9.2)	(9.2)	(9.2)	(9.2)
72%	2.7	1.8	(0.8)	(3.5)	(6.4)	(7.9)	(9.6)	(11.0)	(11.0)	(11.0)	(11.0)
74%	1.8	(0.8)	(3.5)	(6.4)	(7.9)	(9.6)	(11.4)	(12.3)	(12.3)	(12.3)	(12.3)
76%	(0.8)	(3.5)	(6.4)	(7.9)	(9.6)	(11.4)	(12.5)	(13.0)	(13.0)	(13.0)	(13.0)
78%	(3.5)	(6.4)	(7.9)	(9.6)	(11.4)	(12.5)	(13.1)	(13.7)	(13.7)	(13.7)	(13.7)
80%	(6.4)	(7.9)	(9.6)	(11.4)	(12.5)	(13.1)	(13.8)	(14.1)	(14.1)	(14.1)	(14.1)
82%	(7.9)	(9.6)	(11.4)	(12.5)	(13.1)	(13.8)	(14.2)	(14.6)	(14.6)	(14.6)	(14.6)
84%	(9.6)	(11.4)	(12.5)	(13.1)	(13.8)	(14.2)	(14.7)	(14.9)	(14.9)	(14.9)	(14.9)
86%	(11.4)	(12.5)	(13.1)	(13.8)	(14.2)	(14.7)	(15.0)	(15.1)	(15.1)	(15.1)	(15.1)
88%	(12.5)	(13.1)	(13.8)	(14.2)	(14.7)	(15.0)	(15.2)	(15.4)	(15.4)	(15.4)	(15.4)
90%	(13.1)	(13.8)	(14.2)	(14.7)	(15.0)	(15.2)	(15.5)	(15.8)	(15.8)	(15.8)	(15.8)

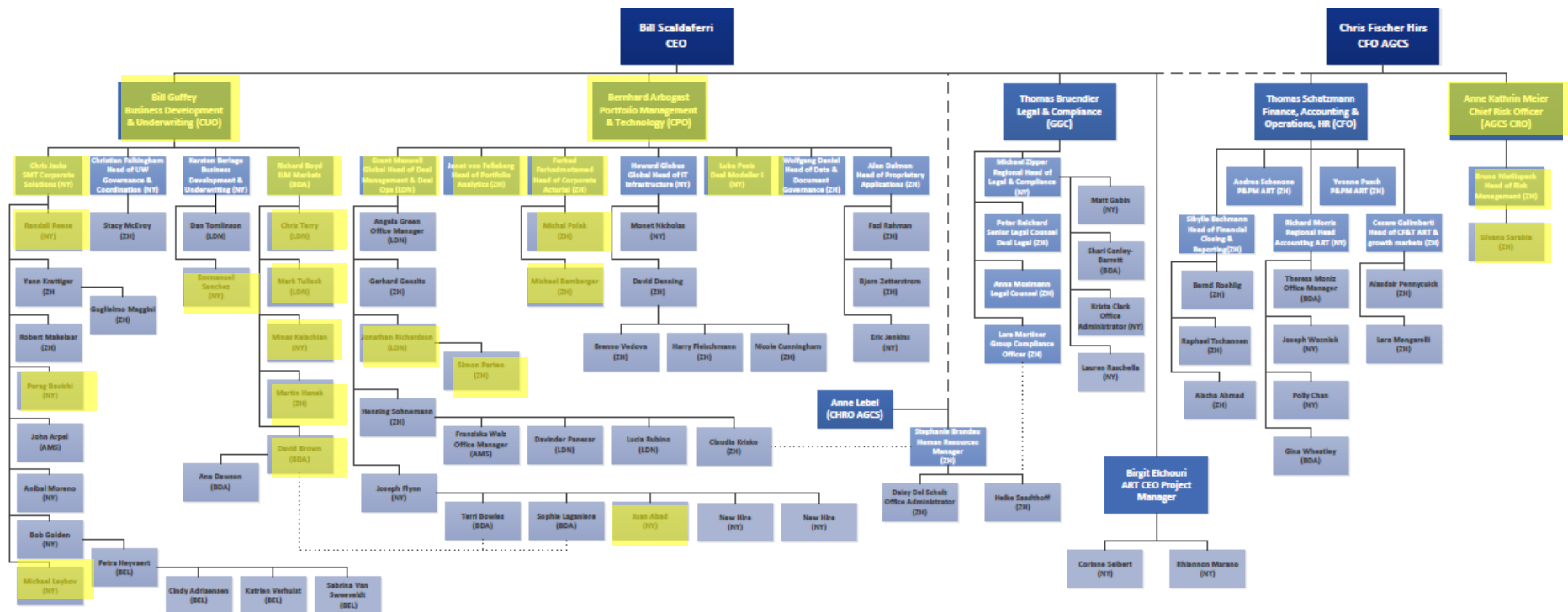


# Agenda

- 1 Allianz Group
- 2 Allianz Risk Transfer (ART)
- 3 ART Business Segments / Deal Examples
- 4 Pricing / Structuring
- 5 **Portfolio Management / Reserving**

# ART People

- 25 Actuaries/Quants/Modellers by background (30% of employees)
- ~50% of UW staff and Portfolio Mgmt staff

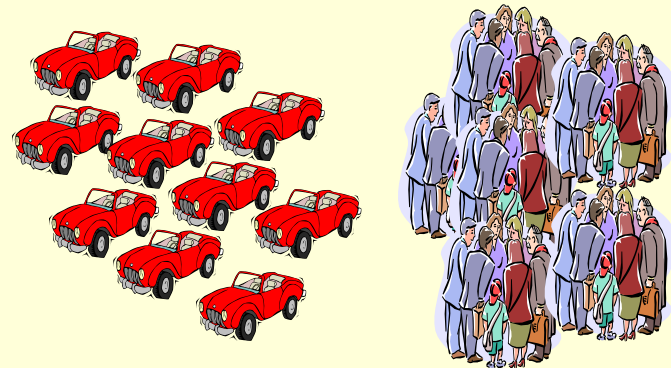


\*As at 2014

# ART's Portfolio Management Approach

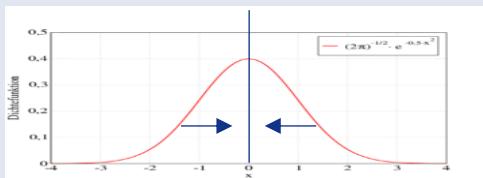
- **Law of Large Numbers**
  - Portfolios of many like risks

**Traditional insurer:**

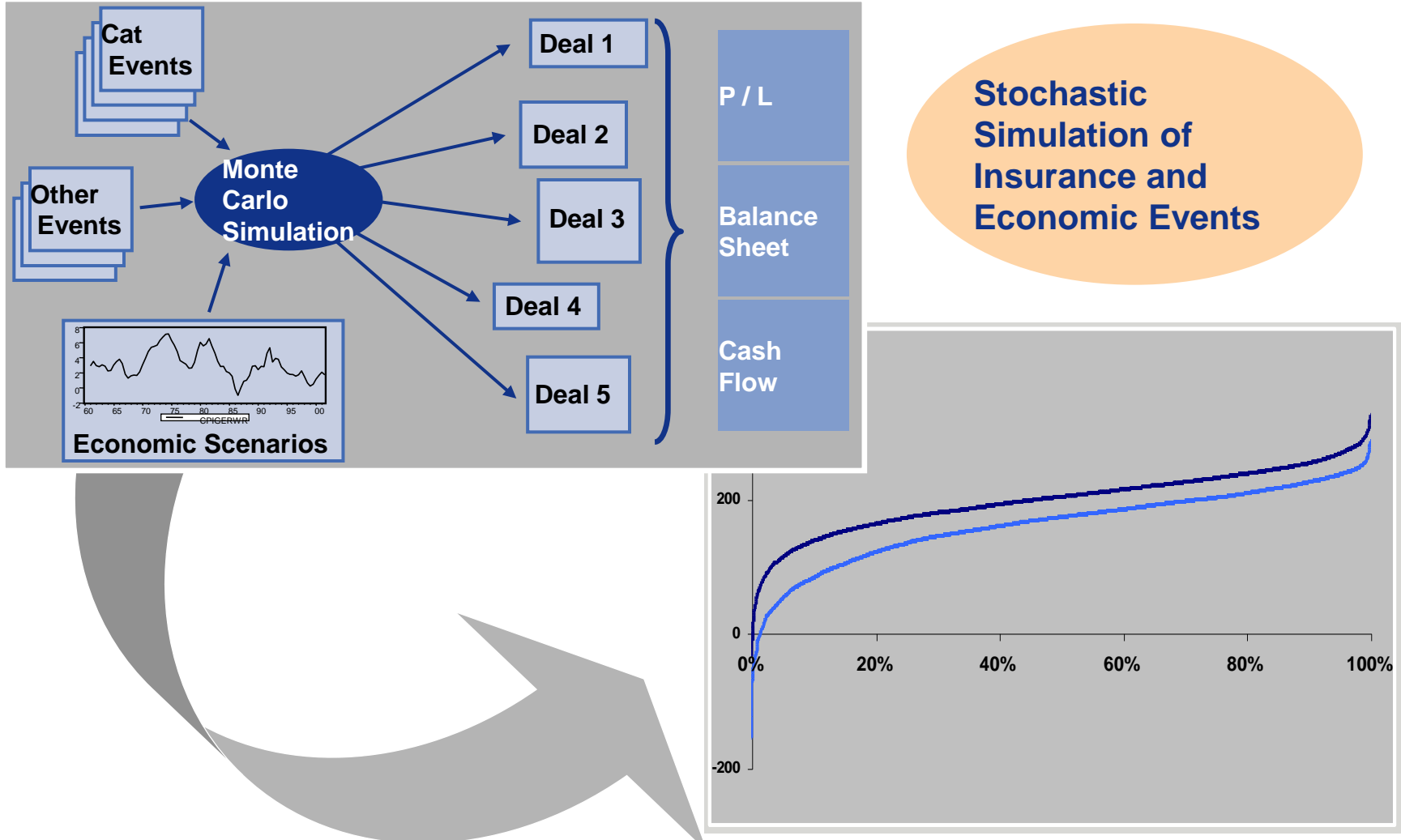


- **Portfolio Theory**
  - Portfolio of many unlike risks
  - Correlation of risk
  - Various risk tolerance limits

**ART:**

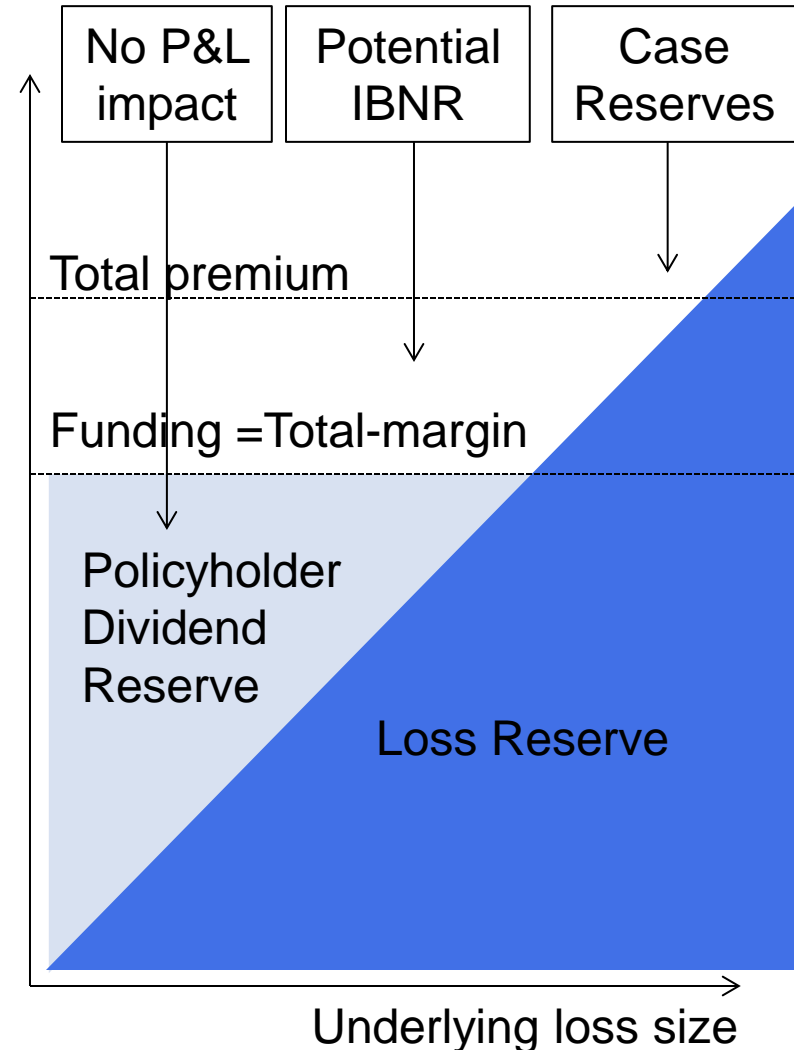


# ART's Modeling Methodology



# Reserving

- No Law of Large Numbers / portfolio effect
- Every deal is its own portfolio -> use transaction models for reserving
- On a transaction level, loss reserve is not a linear function of the underlying loss size:
  - Aggregate Attachments/Limits
  - Optionality – cancellation/extension
  - Funding/ Margin, Policyholder Dividend
- **Solution:**
  - Loss reserves offset with Policyholder Dividend Reserves
  - Losses might trigger premium earning acceleration
  - If term deal performance is impaired (despite), transaction or portfolio IBNR reserves set up



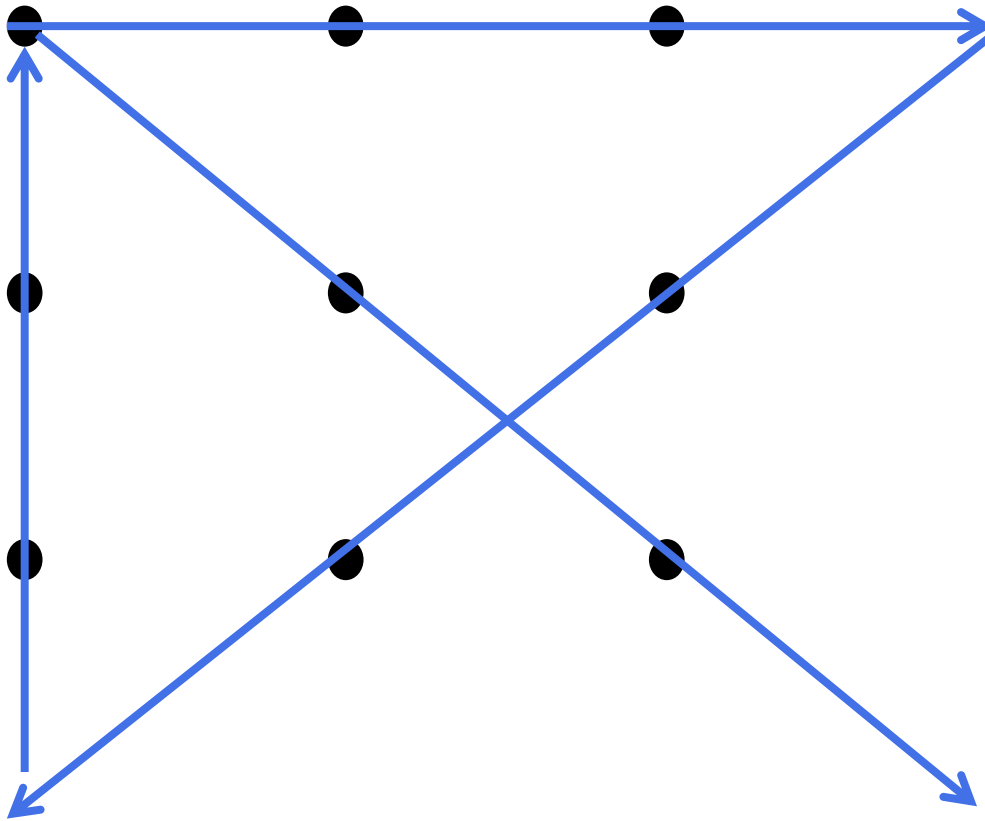




Thank You!!

# Puzzle!!

## Out-of-the-Box Thinking



**Connect all nine points with four straight lines without lifting the pen/pencil once**

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