

# The New Investment Regime Scenario modelling for Investment Firms

### **3 Part Series by Monte Carlo Plus**

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### About us

- Monte Carlo simulation software for modelling risk scenarios
- Validation and audit for risk models including ML and AI
- Senior Team>

Mustafa Çavuş PhD Managing Director



Peter Bonisch Director

List of references and clients >



### Summary of Session 1: New Regime for Investment Firms: Key Regulatory Documents

- FCA: Key priorities outlined in the FCA Business Plan 2019/2020, April 2019
- FCA: Our framework: assessing adequate financial resources, Finalised Guidance, FG 20/1, June 2020
- FCA: A new UK prudential regime for MiFID investment firms, Discussion Paper, DP 20/2, June 2020
- EBA: Issued a roadmap for the implementation and Consultation Paper which contain draft Regulatory Technical Standards (RTS) on prudential requirements, June 2020.

### Summary of Session 1: Risks (Harms) emanating from Business Model and Strategy



### Summary of the new regime:

**Business Model** 



### Summary of Session 2: Peer Benchmarking using scenarios – e.g. overall comparison of inputs and outputs across firms [1]

- For the FCA, the peer analysis is an important component of their review as it provides a 'sense check'. It includes comparison of business models, strength of governance and controls, levels of financial resources, and judgements, and assumptions made.
  - judgements and assumptions regarding the assessment of the likelihood and impact of harm. "We expect firms to understand how appropriate the <u>inputs and outputs</u> of the model are (i.e. the scenarios and assumptions)".



# Summary of Session 2: Peer Benchmarking using scenarios – comparison of inputs and outputs for specific scenarios [2]

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# Who would like to take part in our annual Benchmarking exercise?

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## Summary of Session 2: Peer Benchmarking using Publicly Available Information [1]

- Whereas scenarios represent the basis of comparison for internal assumptions and judgements, we could also peer benchmark firms using Pillar 3 disclosures
- We collect publicly available data on
  - Own funds
  - Minimum capital requirement
  - Remuneration
- Are able to calculate various ratios:
  - Risk / Available Capital
  - FOR / Market + Credit Risk
  - Risk / Remuneration
- As well as other information, e.g.
  - %-age of ICG given
  - Av. remuneration for types of firms

	Firm					
	Name					
	Туре					
	Licence	cence				
	Web					
	Date					
	CapAv			MRToAvCap		
	MR			CRToAvCap		
	CR			CRMRToAvCap		
	FOR			FORToAvCap		
	P1OpRisk			P10pRiskToAvCap		
	Pillar1			TotalRiskToAyCan		
	Wind Down					
Collected	ICG in Ptage	Ca	iculated	l otalRisk i oAulVi		
	ICG			TotalRiskToRem		
	P2 Add-on			ICGtoAvCap		
	Pillar 2			P2vsP1		
	P2OpRisk			P2On Bick To AvCon		
	TotalRisk			F2OpRiskTOAVCap		
	Surplus			TotalRemToAum		
	Solvency			FixedToVariableRem		
	Code Staff					
	Rem. Total					
	Rem. Fixed					
	Kem. Var.					
	AverageRem					
	AUM					

## Summary of Session 2: Peer Benchmarking using Publicly Available Information [2]

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### Summary of the new regime:

**Business Model** 



# **Insight 1:** Potential for overestimating Pillar 2R if methods are too simple (especially for scenarios)



### The FCA expectation on assessment of harm:

What-if scenarios for the activities undertaken & the harms that can be caused

- Likelihood of events, that all events might occur at the same time
- Potential impact on financial resources
- Supported by statistical models

### Insight 2: We need to map scenarios to RtC, RtM, RtF

	Risk Name (from FG 20/1)	RtC	RtM	RtF
1	Mandate breach by portfolio managers	x		x
2	System outages by platform and custody firms	x	x	x
3	Unsuitable advice by financial advisors	x	x	
4	Unsuitable investments by SIPP operators	x		
5	Poor outcomes for investors by advising firms due to insufficient due	x	x	
6	System outages by exchanges		x	x
7	Failure to check costumer's affordability	x		
8	Disruption to continuity of service by payment services firms	x	x	x
9	Market disruption due to rogue algorithms by principal trading firms	x	x	x
10	Market abuse		x	
11	Unreliable performance	X	x	x
12	Disruption to continuity of service	X	x	x

>Is there a 'list' of scenarios?

>For each scenario we need an impact and likelihood

>Any other assumptions?

### **Template 1: Potential Impact from a scenario**

Impact			xtreme but sible case (£)	Typical case(£)	
Remedial costs	Direct cost of 'making good' the effects of the scenario				
Client compensation	Cost of compensating the client(s) and putting them in the position they should have been in		From FCA FG 2	20/1:	
Legal liability	Judgements, settlements and other legal costs		<ul> <li>Compensation &amp; redress schemes for misconduct (part voluntary redress sc</li> <li>Enforcement and fines (investigation)</li> </ul>		
Regulatory fines	Transaction reporting requirements and basis for fines set out on FCA website: https://www.fca.org.uk/markets/transaction- reporting		enforcement actions by the FCA, whi might result in fine) - Direct and indirect litigation costs – compensate consumers or other firm		ch (to s
Impact on revenue	Lost revenue should typically be included if the reduction means that revenues would not cover costs for the duration of the scenario.	seeking redress through legal actic - payments to protect its franchise reputation to stay in business		s through legal action) protect its franchise an tay in business	ıd
	The inclusion of lost revenues where revenue would still cover costs is discretionary and needs to be assessed on a case by case basis				
Impact on brand value	e If possible, estimate the likely impact in				
	monetary terms of any damage to the brand.				
	Be careful not to double-count on lost revenues				

### **Template 2: Likelihood for a scenario**

### How often do you think that an event of this type may occur:

Highly possible	50% chance of happening in the next 12 months or occurs at least once every 2 years	
Possible	20% – 50% chance of happening in the next 12 months or occurs once in every 2 to 5 years	
Unlikely	10% - 20% chance of happening in the next 12 months or occurs once in every 5 to 10 years	
Remote	less than 10% chance of happening in the next 12 months or occurs less than once in every 10 to 20 years	
Very remote	less than 5% chance of happening in the next 12 months or occurs less than once in every 20 to 100 years	x
Extremely remote	less than 1% chance of happening in the next 12 months or occurs no more than once in every 100 to 200 years or less	

#### Justification for the frequency assessment

### Examples of Brokerage Scenarios mapped to RtC, RtM, RtF and Basel Loss Types from our 2019 Benchmark

Description	Typical Impact	Extreme but plausible Impact	Likelihood	Harm Type	Basel II Type
BCP incidence	108,000	5,350,000	10%	RtC	BDSF
System outage	506,000	7,360,000	20%	RtM RtF	BDSF
Significant trading error	352,000	5,950,000	20%	RtM RtF	EDPM
Cyber security, data breach	1,130,000	8,700,000	10%	RtC RtF	BDSF
Product flaw	898,000	5,928,000	5%	RtC RtF	CPBP
FX error	456,000	3,100,000	10%	RtF	EDPM
Improper business or market practices	920,000	5,050,000	20%	RtC RtM RtF	CPBP
Significant external fraud event	110,000	6,700,000	5%	RtF	EF
Internal fraud scenario	545,000	1,180,000	10%	RtF	IF
Large manual processing error	387,000	3,960,000	35%	RtC RtF	EDPM
Key vendor or supplier failure	305,000	4,030,000	35%	RtC RtM RtF	BDSF
Key people risk	750,000	4,900,000	20%	RtF	EPWS

### What is the "risk amount" for a scenario?

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		<u>+</u> +			
Probability x Impact will mislea	d!	E7.36m x 20%	= £1	.47m	akin to "median"
However> the true risk amount for the system outage scenario is different: Risk amount at 1 in $200 = f10.11m$					

### "System Outage" Scenario Explained



#### **Assumptions:**

- 1. Lognormal model best describes impact distribution
- Extreme but plausible impact assessed by subject matter expert who has average of 20 years of relevant experience (i.e. 1 in 20 = 5% → The expert is 95% confident that the impact won't be bigger than the extreme but plausible value estimation).
- 3. Poisson best describes the likelihood.

### "System Outage" Scenario Explained [2]



we can still extrapolate to 200 years using the two inputs.

 $\rightarrow$  However, the required capital for the risk amount is not the extrapolated impact value. The risk amount is found by combining the "likelihood" on the left with "impact" on the right.

### "System Outage" Scenario Explained [3]



### **Combining Likelihood and Impact dimensions**

is the capital required at the 99.5% confidence level (1 in 200) for one-year horizon, if the "system outage" event is expected to occur every year?



## **Combining Likelihood and Impact dimensions**

is the capital required at the 99.5% confidence level (1 in 200) for one-year horizon, if the "system outage" event is expected to occur every year?

If the event is NOT expected to occur every year ?

Likelihood	Impact	Capital required at the 99.5% conf. level
Every year (100%)		18.83m
Every two years (50%)		14.64m
Every five years (20%)	$\wedge$	10.11m
Every ten years (10%)		7.40m
Every twenty years (5%)		5.10m
Every 100 years (1%)		1.40m

### **Conclusion:**

1. For scenario analysis the likelihood dimension should not be neglected. The likelihood depends on quality of preventative controls. Dynamic and risk sensitive approach links this to firms' behaviour.

2. There is varying degree of sensitivity of capital requirement to the probability of occurrence (compare 10% vs 5% and 50% vs 25%)

## Sensitivity of capital requirement to likelihood

 $\rightarrow$  The change in capital requirement is not linear.

 $\rightarrow$  Higher sensitivity at low probability levels



## Sensitivity to extreme but plausible impact

→ The change in capital requirement is almost linear
 → But remember the diversification benefit



### Sensitivity to assumed correlations Higher correlations mean higher requirement



### **Insight 4:** Capital requirements are not additive . . .





### **Simulation Results for the Broker Scenarios**

Capital Requirements in Aggregate at 99.50% C.L.

Total Capital Required	34,762,127
Diversification Benefit	37,643,972
Total Capital w/o Div.Ben.	72,406,100

#### **Risk Ranking**



#### Improvement Ranking



34,762,127	<b>51.99%</b>
Aggregate Risk	Diversification Benefit

#### Breakdown into Loss Types



#### **Breakdown into Harm Types**



### **Model limitation**

- Choice of curve
  - However, log-normal curve is a widely-used approximation
- Using a curve smoothens out the actual reality of an event's impact
  - the model needs a curve to generate random impacts per iteration
- Inputs are best estimates using subject mater expertise
  - Inputs are subject to rigorous analysis and challenge

### **Expected Benefits [1] Reduction in capital required**

- Our experience with most of our clients is that there is an immediate reduction in overall Pillar 2 capital requirement from operational risk scenarios.
- This is because the simple approach of summing extreme but plausible scenarios does not take account of diversification between them. Rather it assumes that all scenarios are expected to occur over the next year and all with extreme but plausible financial impact.
- The operational risk events, however, cannot happen all at the same time, and even if they did, not all of them will be extreme.
- The Monte Carlo approach is different it captures the diversification nature contained between operational risk events. Therefore, this results in a lower capital requirement in comparison.

### **Further Expected Benefits [2]:**

- Satisfies the use test: Using the tool / methodology risk based decision making can be demonstrated. For example, it can be used in New Product Approval Process where risks can be quantitatively assessed.
  - Some of our clients use it for cyber loss modelling and buying an insurance for cyber scenarios.
  - Improved focus on real risks: Tail events from scenarios become priority.
- Links risks and stress scenarios to strategies and appetite in a way that matrices and risk registers cannot: The dynamic way of looking at risks and stresses through using the model's what-if analysis functionality feeds in to the firm's capital management planning process.

### **Concluding Remarks**

- Modelling scenarios is not an exact science
- Scenarios can only be constructed on a best endeavours basis, so
- Make good use of available data (internal & external) and expert judgement
- Ensure robust governance & management review assumptions rigorously challenged
- Use a model that is well understood ( $\rightarrow$  Lognormal)
- Review and sense check the inputs and outputs of the model (e.g. benchmarking)



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