LIMA Programme

Marrying Analytics and Business Decision Making

10 August 2023

Nicholas Song

Munich RE

NOT IF, BUT HOW

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LIMA Programme
2023

Agenda

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01

Introduction to Pricing

02

All About the Pricing

03

All About the Customer

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01 Introduction to pricing

The Pricing Workflow

Looking at the Risk, the Market or Both…

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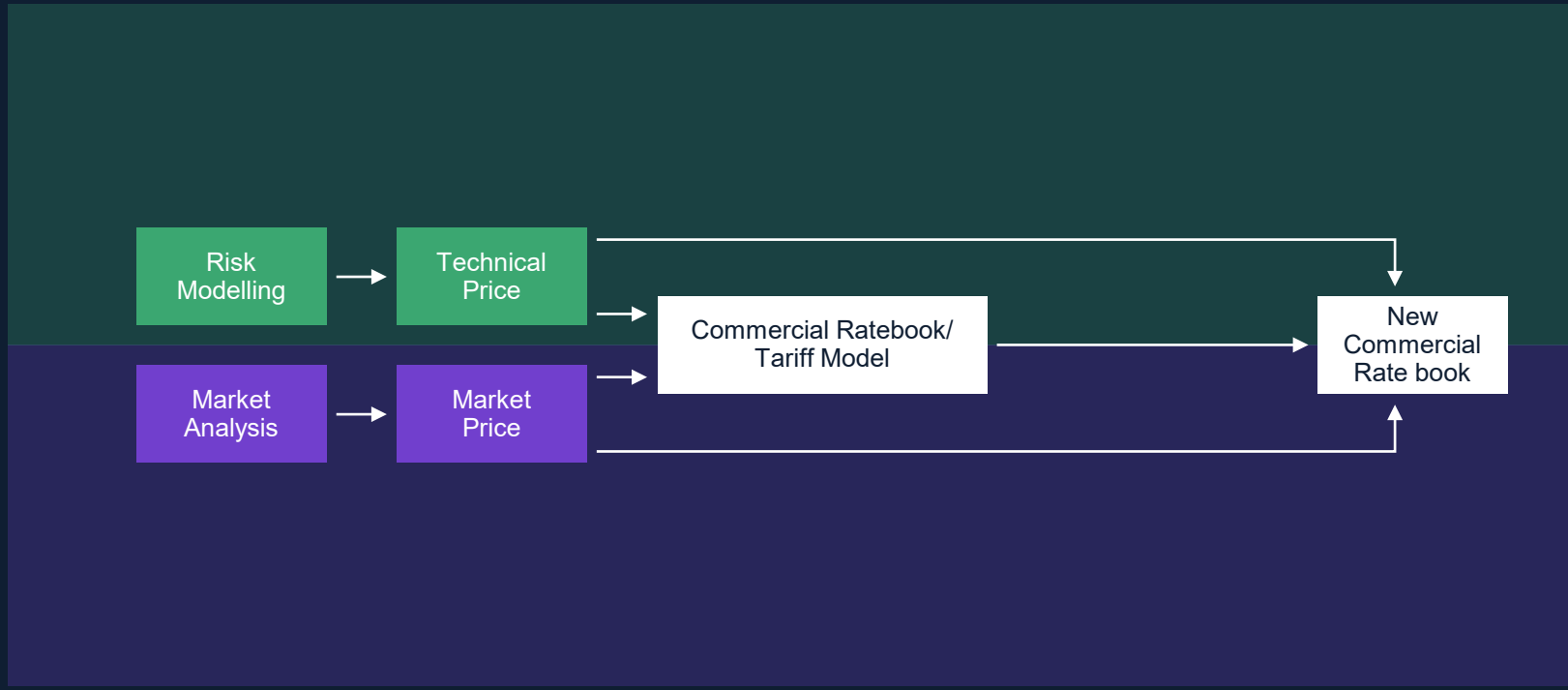
Risk View

Market View



The Pricing Workflow

Looking at the Risk, the Market or Both… and Possible Enrichments

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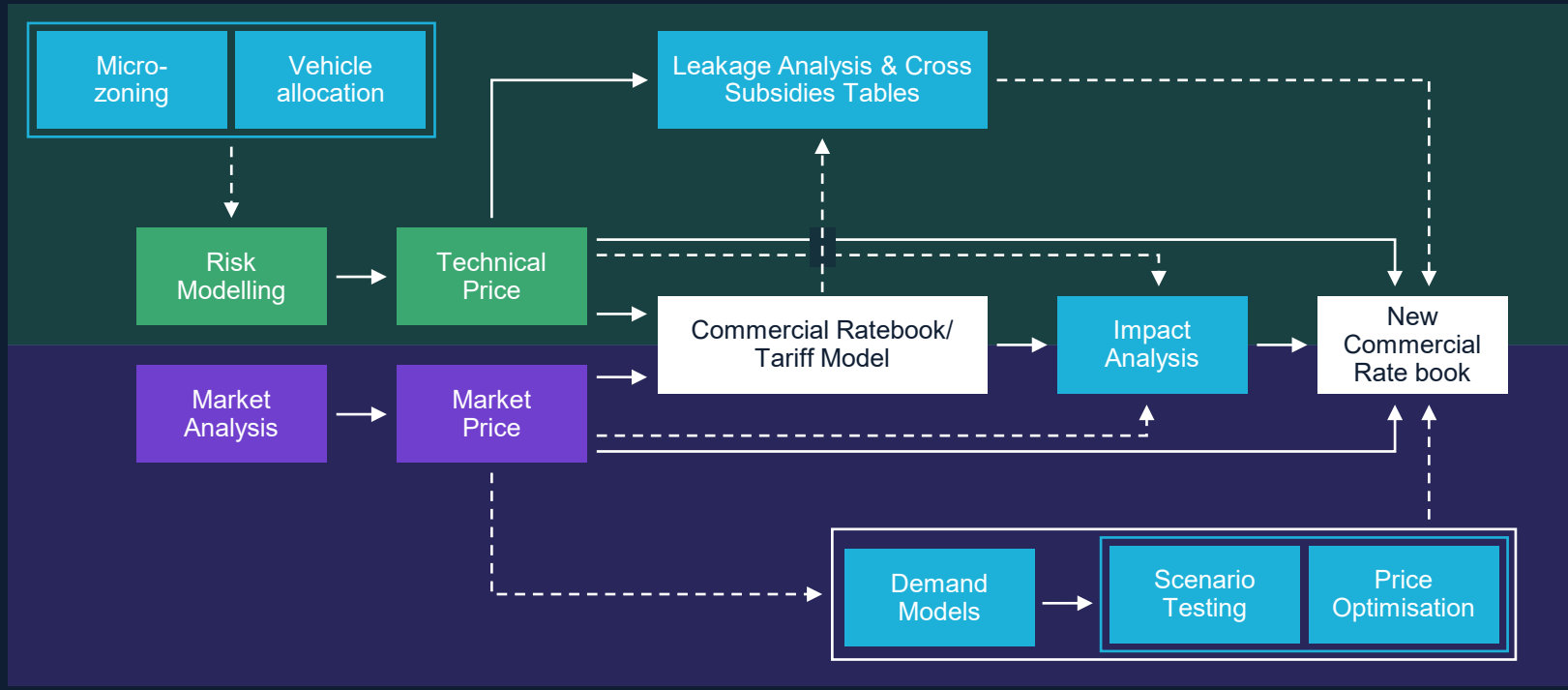

Today's Main Messages

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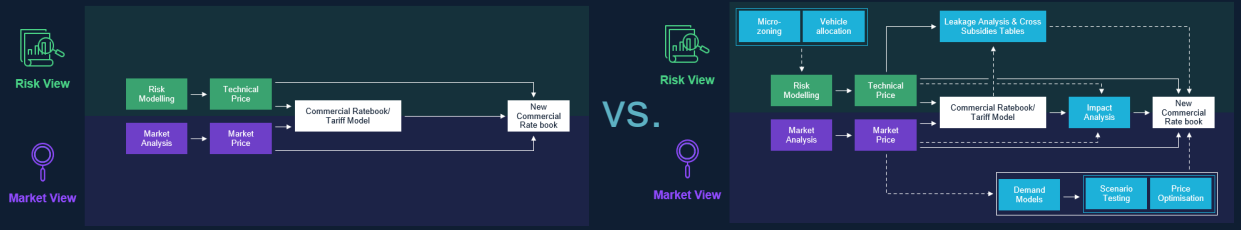
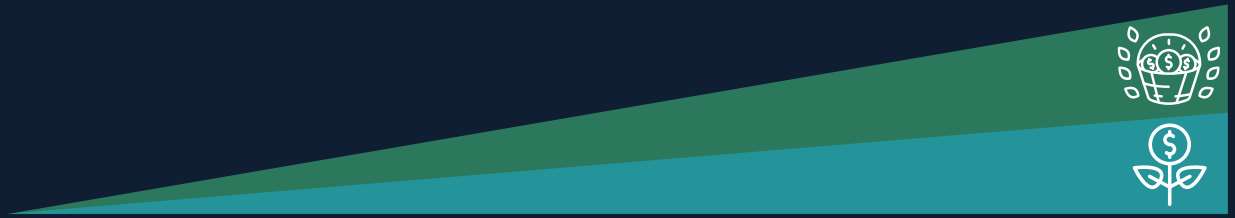




The pricing process can be simple, sophisticated or anything in between.

Costs but also business value scale with the effort put into the pricing.

It is about choosing the right set-up for your individual goal and using all the benefits every tool provides.

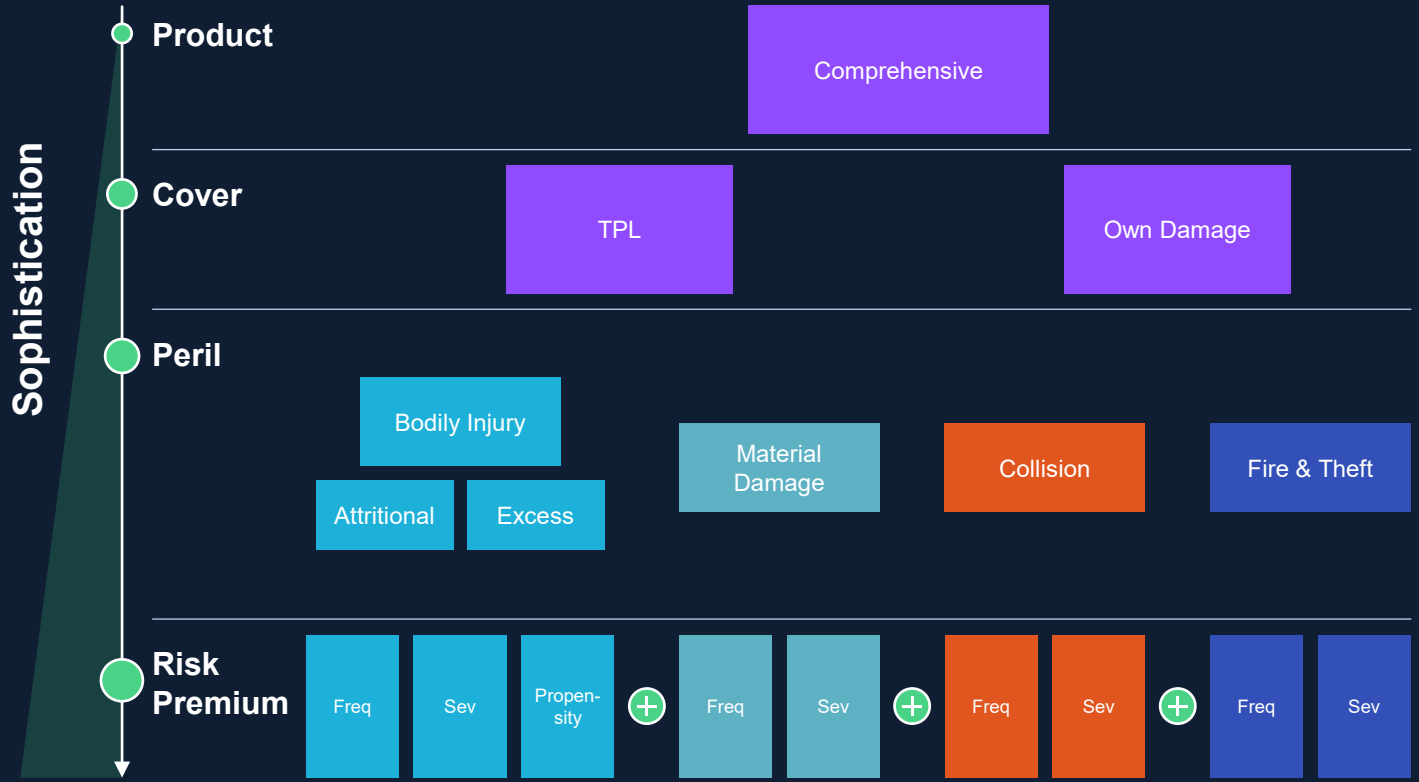
Image: Munich Re

02

All About the Pricing

Risk Modelling

Illustrative Granularity of Motor Products



Process

Policy data + Claims data + External data

GLM or ML modelling

Risk pricing at policyholder level

Vehicle Allocation

From a Simple Database to a Consistent Spatial Representation

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Country	Make	Model	Model (platform) years	Model body (platform) years	Model type/engine version	Full model name + description
Italy	Alfa Romeo	Mito	Mito 2008–present	Mito hatchback 2008–present	Mito 1.4 16V	Mito 1.4 16V (1368 cm³, 70 PS)
Italy	Alfa Romeo	Mito	Mito 2008–present	Mito hatchback 2008–present	Mito 1.4 16V	Mito 1.4 16V (1368 cm³, 78 PS)
Italy	Alfa Romeo	Mito	Mito 2008–present	Mito hatchback 2008–present	Mito 1.4 8V	Mito 1.4 8V (1368 cm³, 78 PS)
Italy	Alfa Romeo	Mito	Mito 2008–present	Mito hatchback 2008–present	Mito 1.4 16V	Mito 1.4 16V (1368 cm3, 78 PS)

Vehicle database

- Vehicles list
- Extended list of available features available

Spatial Representation

- Projection in R^n space
- Proven methodology
- Advanced machine learning algorithms

Consistency in projection

- Vehicles with similar features are located on neighbouring regions
- Vision across the various vehicle features

Business Value

- More precision in risk assessment
- Price new vehicles

Microzoning

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Increasing Level of Geo-Spatial Smoothing

Residuals*
tend to overfit existing data while not guaranteeing stable results.

Medium Smoothing
gives a trade-off between local values and local averages.

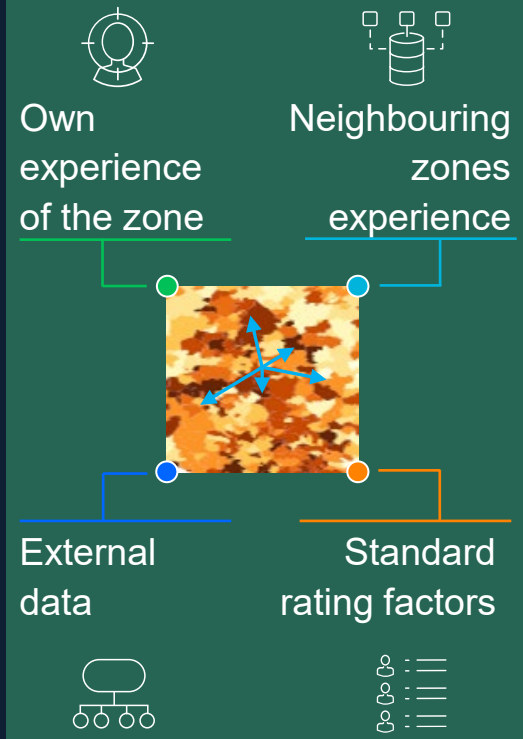
Strong Smoothing
detects coarse spatial patterns.

Constant
does not consider spatial effects and constitutes an under-complex model.

Business Value

- Improve the risk assessment
- Increase accuracy in steering the book

*based on randomly generated data



Technical Price in Action

Defining the New Commercial Rate

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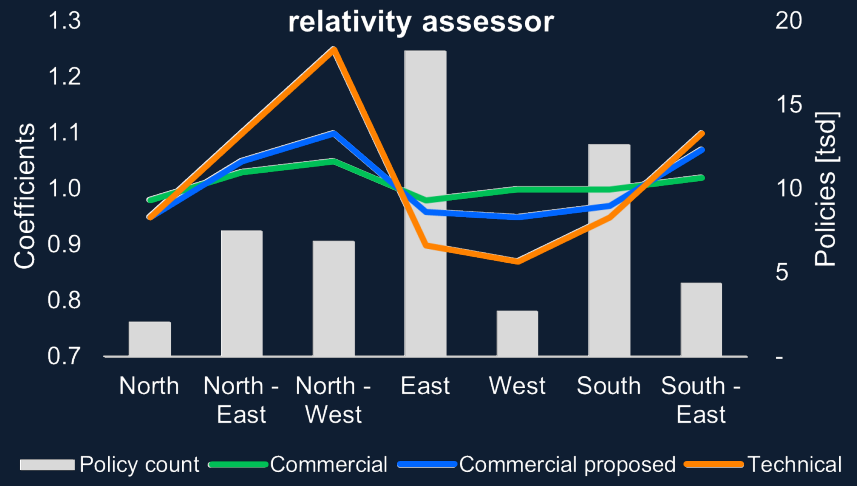
			Relativity Assessor			
Region	Policy count	Distribution %	Commercial relativity	Commercial relativity new	Technical relativity normalized	% Difference new vs current
(1)	(2)	(3)	(4)	(5)	(6)	(7) = [(5)-(4)] / (4)
North	2,100	3.8%	0.98	0.95	0.95	-3.0%
North - East	7,515	13.8%	1.03	1.05	1.10	1.9%
North - West	6,928	12.7%	1.05	1.10	1.25	4.8%
East	18,246	33.4%	0.98	0.96	0.90	-2.0%
West	2,750	5.0%	1.00	0.95	0.87	-5.0%
South	12,658	23.2%	1.00	0.97	0.95	-3.2%
South - East	4,399	8.1%	1.02	1.07	1.10	4.9%
Total	**54,596**	**100%**	**1.00**	**1.00**	**1.00**	**-0.5%**



Business Value

Enhance risk sophistication in commercial tariff

Leakage Analysis in Detail

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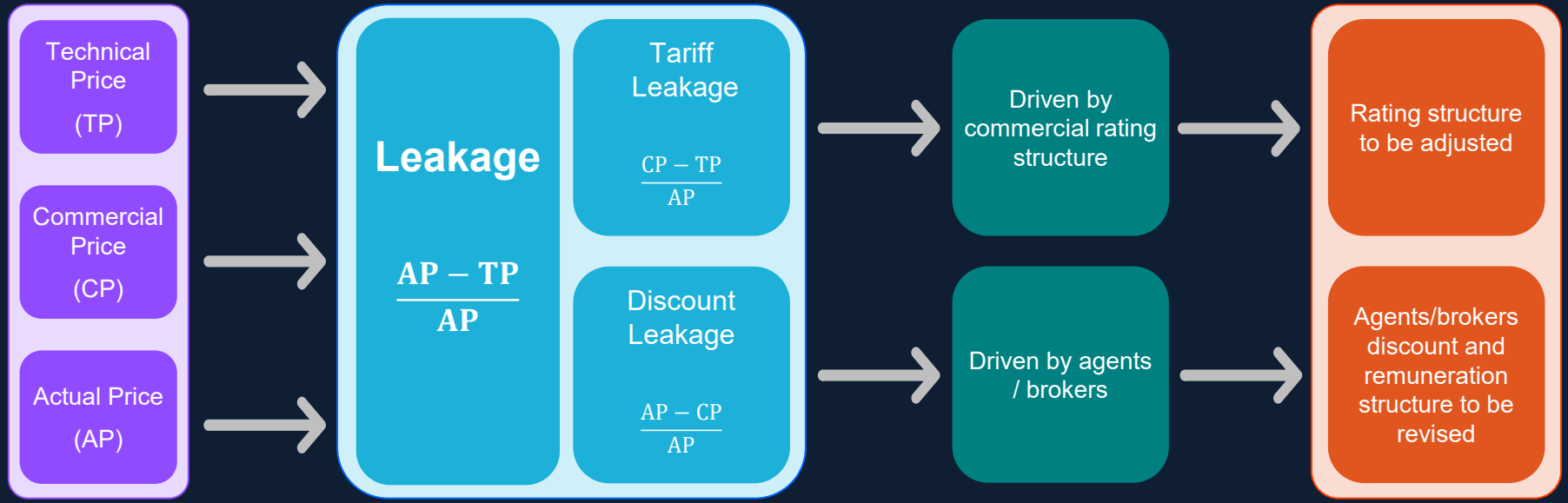

Application and Benefits of Leakage Analysis

Reporting and Steering the Business Right – Leakage of the Portfolio

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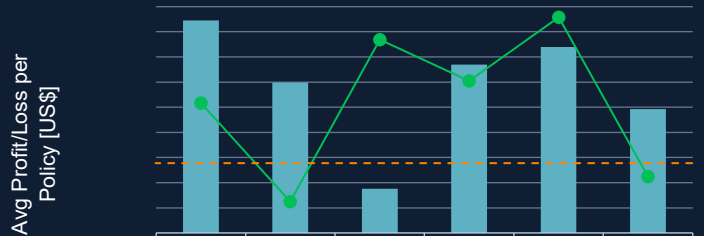
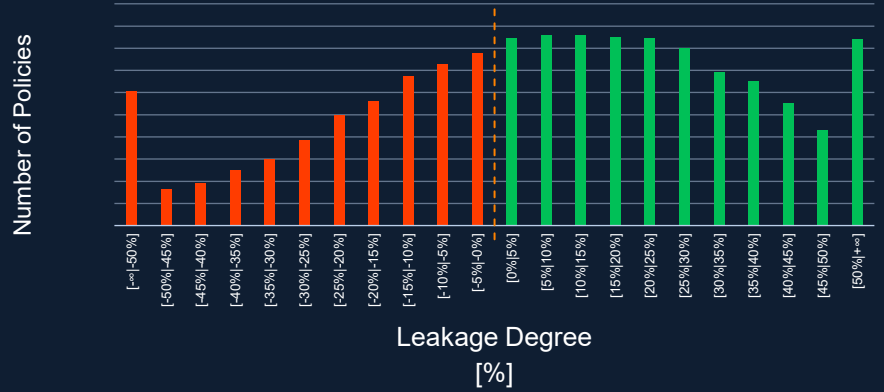
Leakage per region (premium)



	A	B	C	D	E	F
No. of Policies	16,908	11,976	3,523	13,385	14,794	9,863
Avg Profit/Loss	40.32	-20.65	79.66	54.09	93.43	-5.11

Leakage distribution (premium)



Total leakage (premium and discount)

Business Type	Profit-making vs. Loss-making Policies	Tariff Leakage	Discount Leakage	Total Leakage
New Business	2,441 - 3,186	22.1%	-26.2%	-4.1%
Renewal	35,946 - 28,876	36.2%	-31.4%	4.8%
Total	**38,387 - 32,062**	**34.8%**	**-30.9%**	**4.0%**

Business Value

Identify inefficient segments and also the reasons behind

Impact Analysis

Use the Technical Price to Steer your Portfolio

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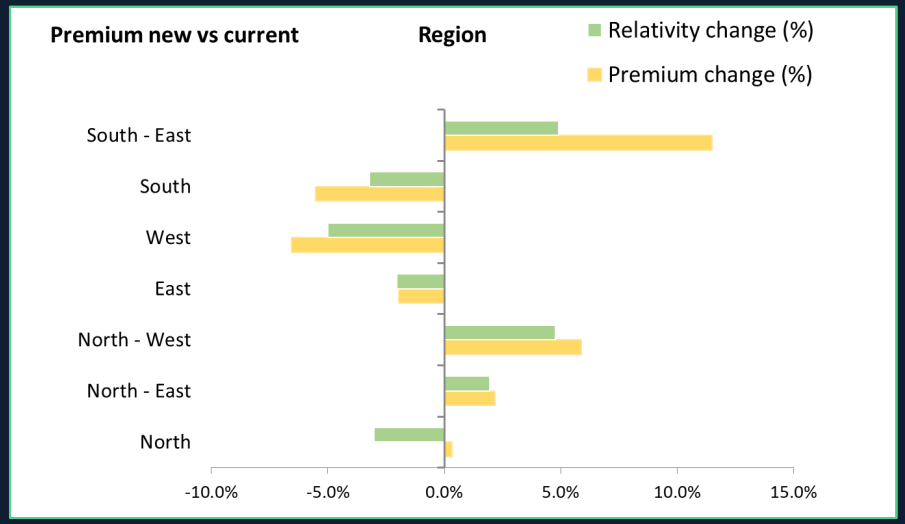

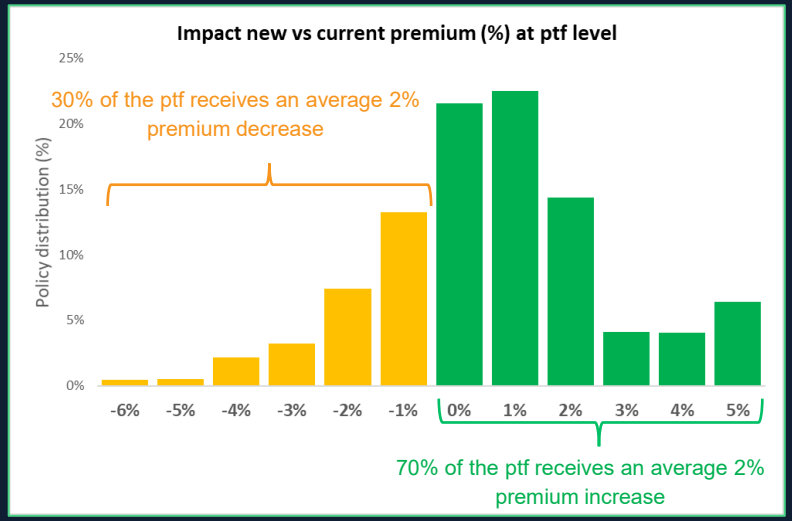

The tariff change impact should be measured at variable level and at portfolio level at the same time

Business Value

Control the effects of rate adjustments

Market View as an Alternative / Supportive Approach

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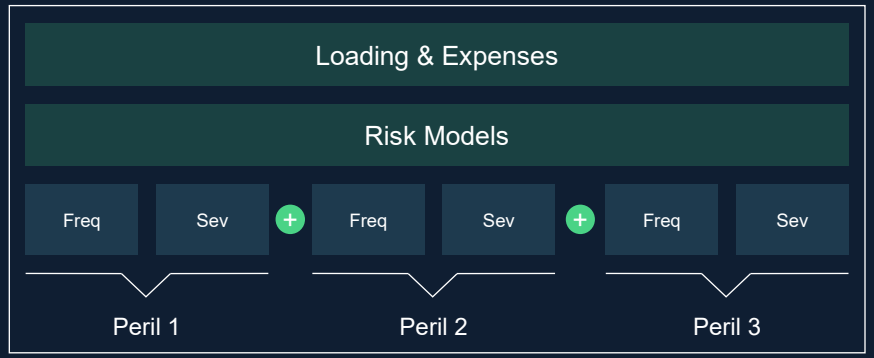
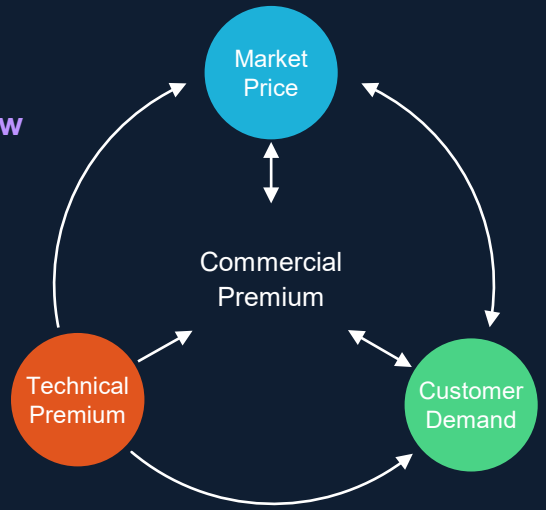
Risk View

Technical Premium



Market View



- Technical premium is based on the risk view of the insurer
- Risk models do not consider competitor prices or customer demand

- Commercial premium is based on the complex combination of technical premium, customer demand and market price
- Market price and customer demand interact with each other

Market Price is a Guide in Making Price Change Decisions

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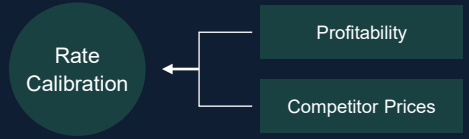
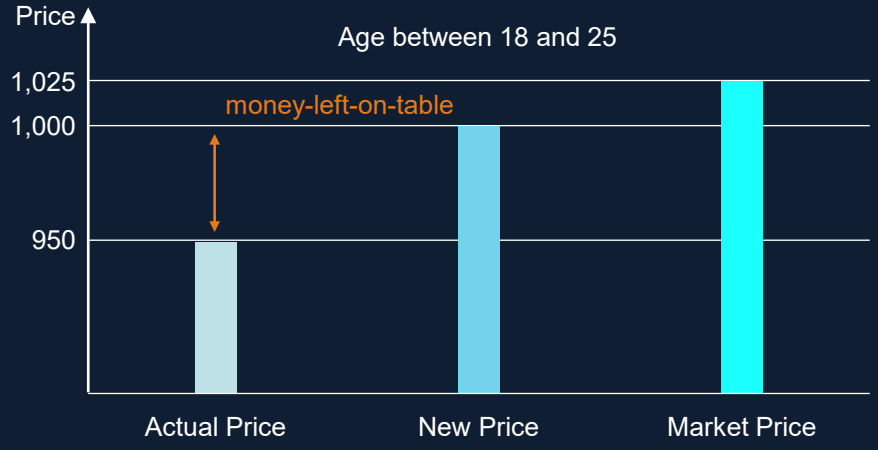
Making price change decisions



Example: Rate calibration by customer age

Age	Street Price	Exposure (%)	Projected Loss Ratio	Predicted Market Price
18 – 25	950	10%	75%	1,025
26 – 35	625	25%	70%	600
36 – 45	500	40%	65%	500
45 – 65	650	20%	60%	600
65+	800	5%	65%	900

Estimate change in the customer mix



- In which segments do street prices differ from market prices?
- Are high-LR segments under-charged?

- What is the size of money-left-on-table in low-LR segments?
- In which direction do market prices move?

Market Price (CMA)

Taking Into Account Market Positioning to Improve Pricing Adequacy

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Competitive Environment

Company	Rank	Price
Company 1	2	95
Company 2	1	88
Company 3	5	116
Company 4	3	102
Your Company	4	107

Methodology

- Environment understanding
- Target definition
- Profiles definition
- Data collection
- Reverse engineering via the application of GLM/ML/AI techniques

Impact

- Understand competitors' market positioning at a granular level
- Increased price adjustment capabilities
- Optimised margins
- Increased conversion/ retention rate

Business Value

Gain market intelligence to complement or replace the technical price

Image: Munich Re

03

All About the Customer

What is Price Optimisation

Adjusting the Final Price Considering Customer Behaviour

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Definition of Price Optimisation

“The supplementation of traditional actuarial loss cost models to include quantitative customer demand models for use in determining customer prices.”

Casualty Actuarial Society

“The process of maximizing or minimizing a business metric using sophisticated tools and models to quantify business considerations.”

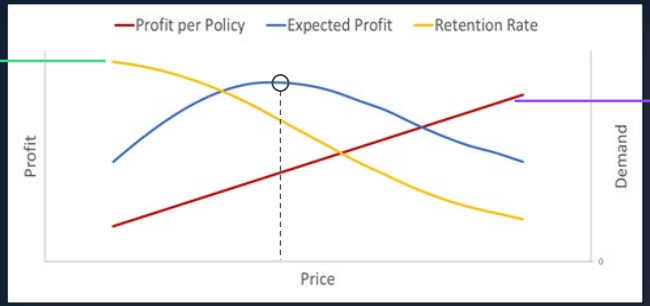
NAIC, Casualty Actuarial and Statistical (C) Task Force

Price optimisation uses data analysis techniques to pursue two main goals:

- Understanding the customer reaction to different pricing strategies for insurance products
- Finding the best pricing strategies considering different goals and constraints

Demand

Decreases with increasing price



Profit per policy

Increases linearly with the price

Components of Price Optimisation Process

Each Component Brings Value in Achieving Optimal Pricing Positions

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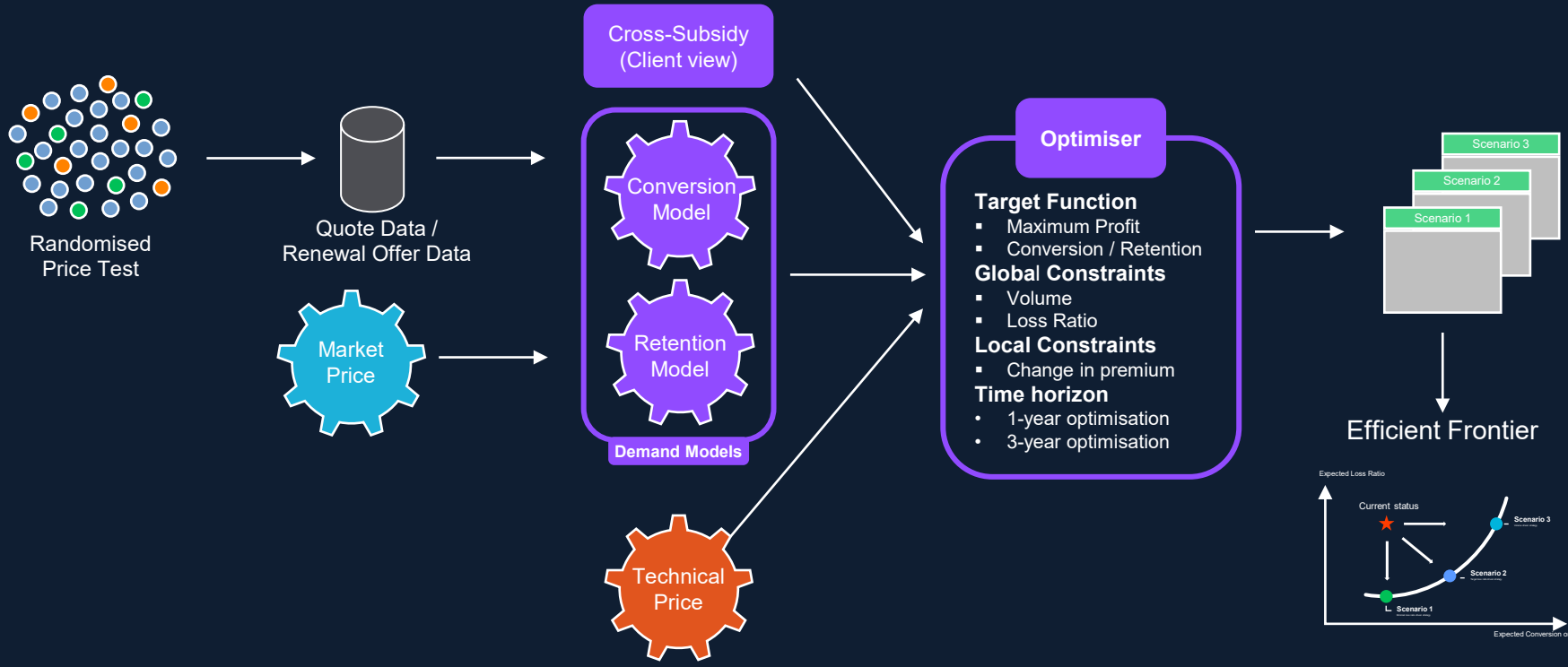

How will Customers React

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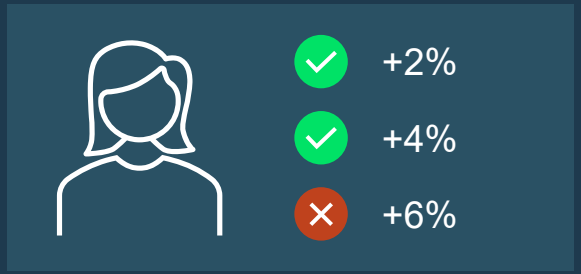
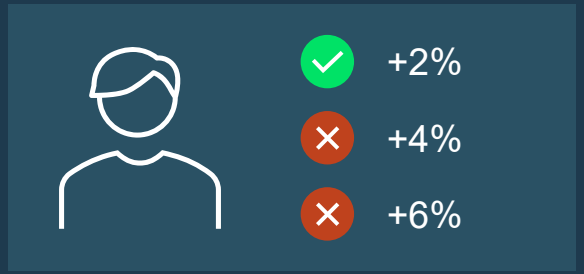
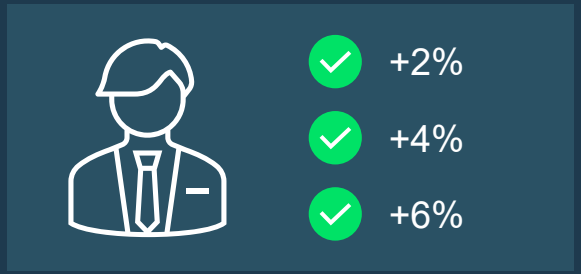
Since all changes on the price will affect customers directly,
it is important to understand and predict their behaviour.







Need for behavioural modelling

Behavioural Pricing

Behavioural Modelling for Impact Analysis of Pricing Decisions

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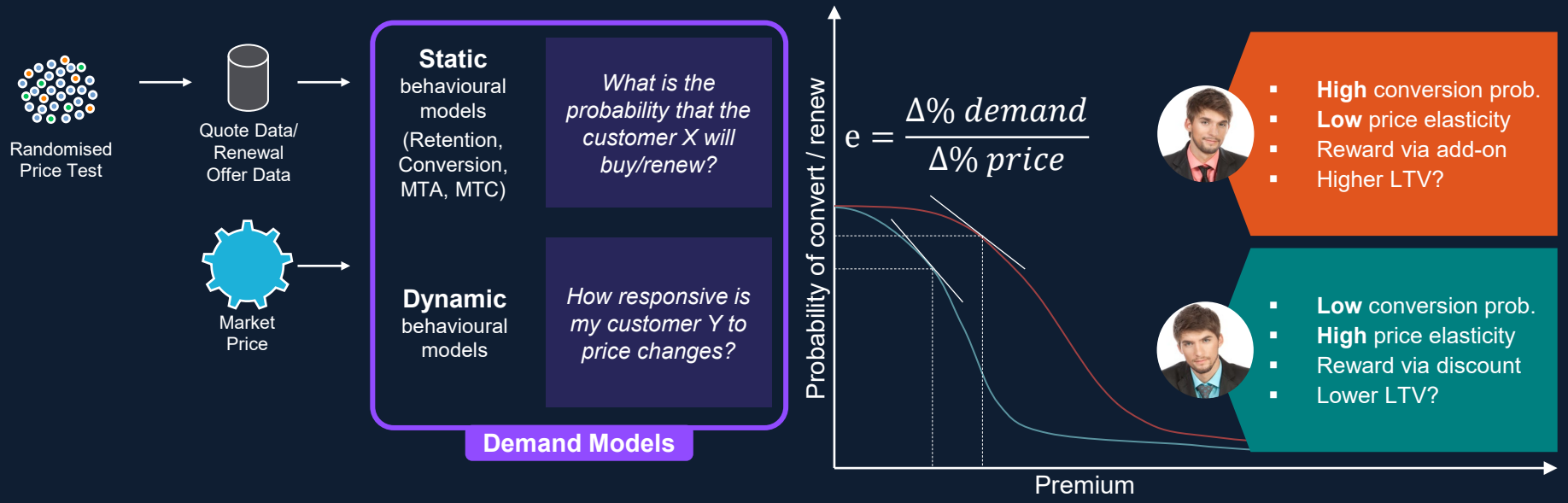

Business Value

Modelling purchase probability and price sensitivity at once allows to assess the impact of price changes on production

The Time Horizon: Customer Lifetime Value

Estimating customer value

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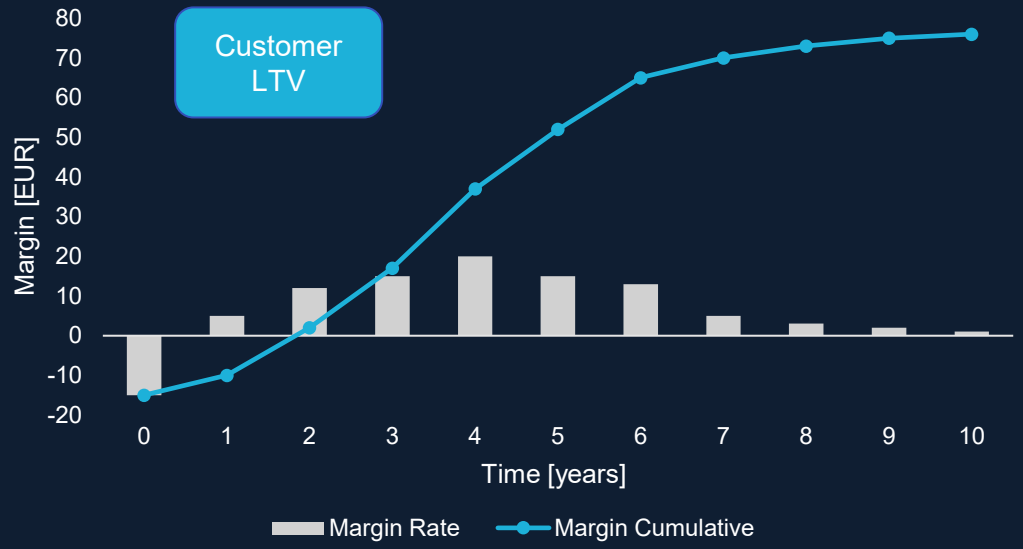

Main Components of customer LTV

- Expenses
- Technical Price
- Profit Margin
- Retention
- Cross-sell
- Elasticity

Policy aging year-on-year → Evolve profitability of every policy → Compute yearly expected margin → Compute cumulative lifetime margin

Business Value

Enrich strategic considerations by a longer time horizon

Pricing Towards the Goals

Always Taking an Optimal Pricing Position

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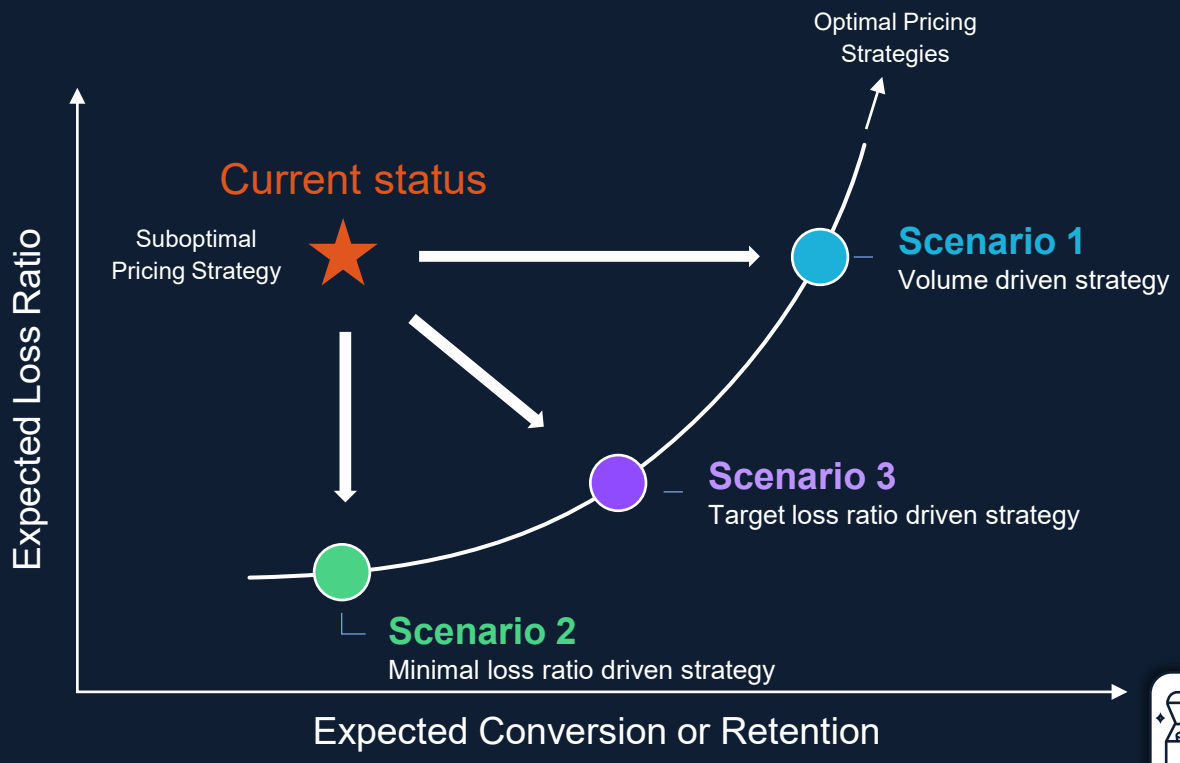

The optimal pricing positions are constantly changing

- Risk modelling
- Market prices
- Customer behaviour
- Macroeconomic effects and regulation

Business Value

Price optimization is the navigation system set on your business objectives

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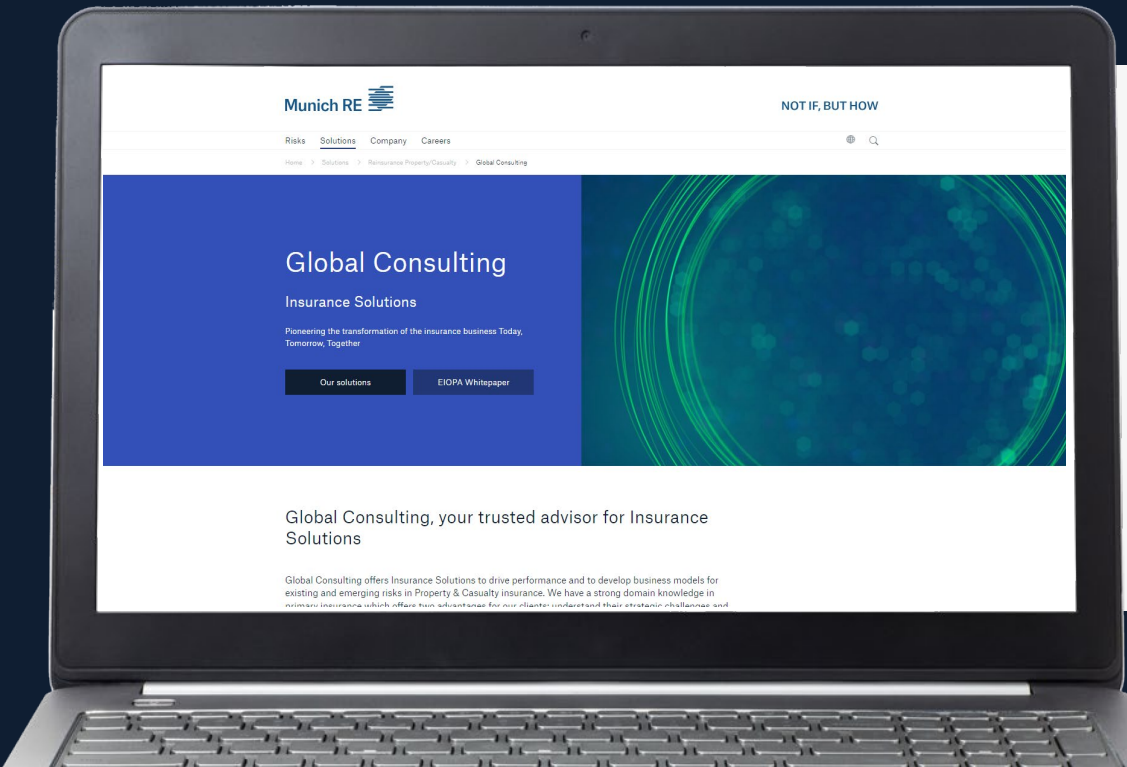

Thank you for your attention!

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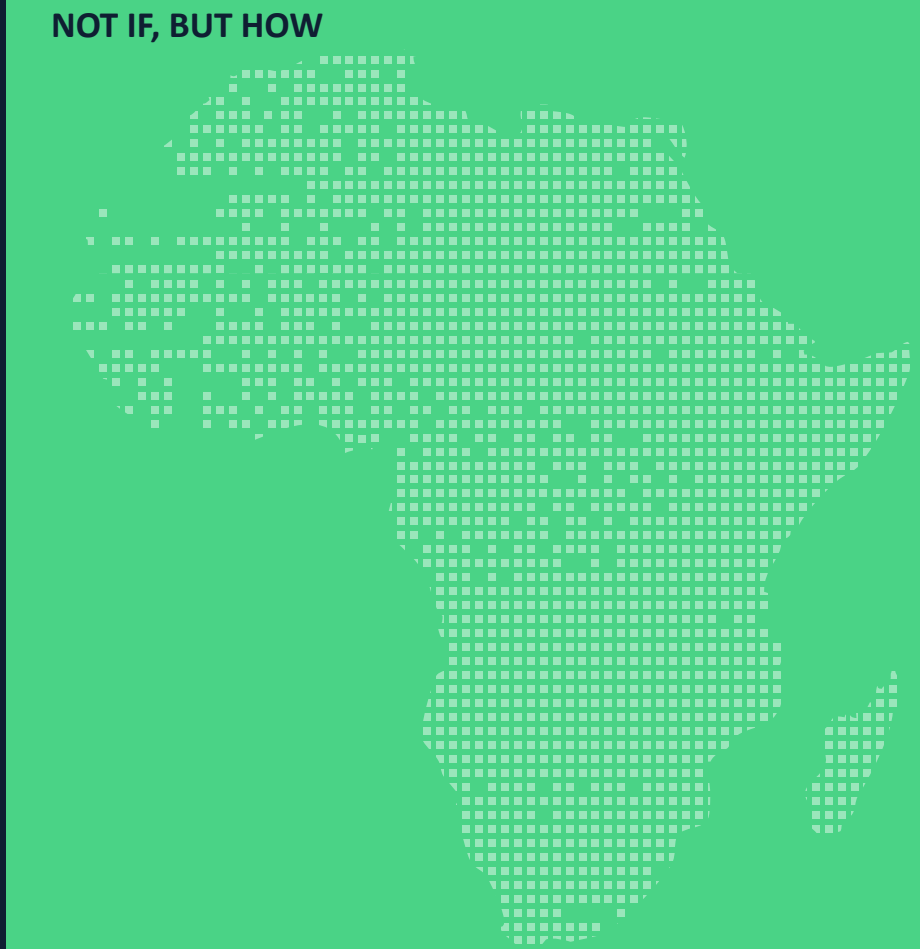

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