



Squeezing Price Elasticity into the Pricing Matrix

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Key points to be covered in the next 60 minutes

1. European insurers have realized substantial benefits by using price elasticity in their pricing models
2. In the US, though European approach is prohibited, 'intuition led' changes motivated by price elasticity occur
3. By being a bit more scientific while incorporating elasticity we can improve performance
 - Without changing the rating structure
 - Without introducing new variables in the ROC
 - While maintaining 'loss cost' as the most important component of pricing
4. Using price elasticity, we can optimize prices while staying within the allowable band of loss cost indicated relativities

How do you determine the scope for improvement in your pricing model?

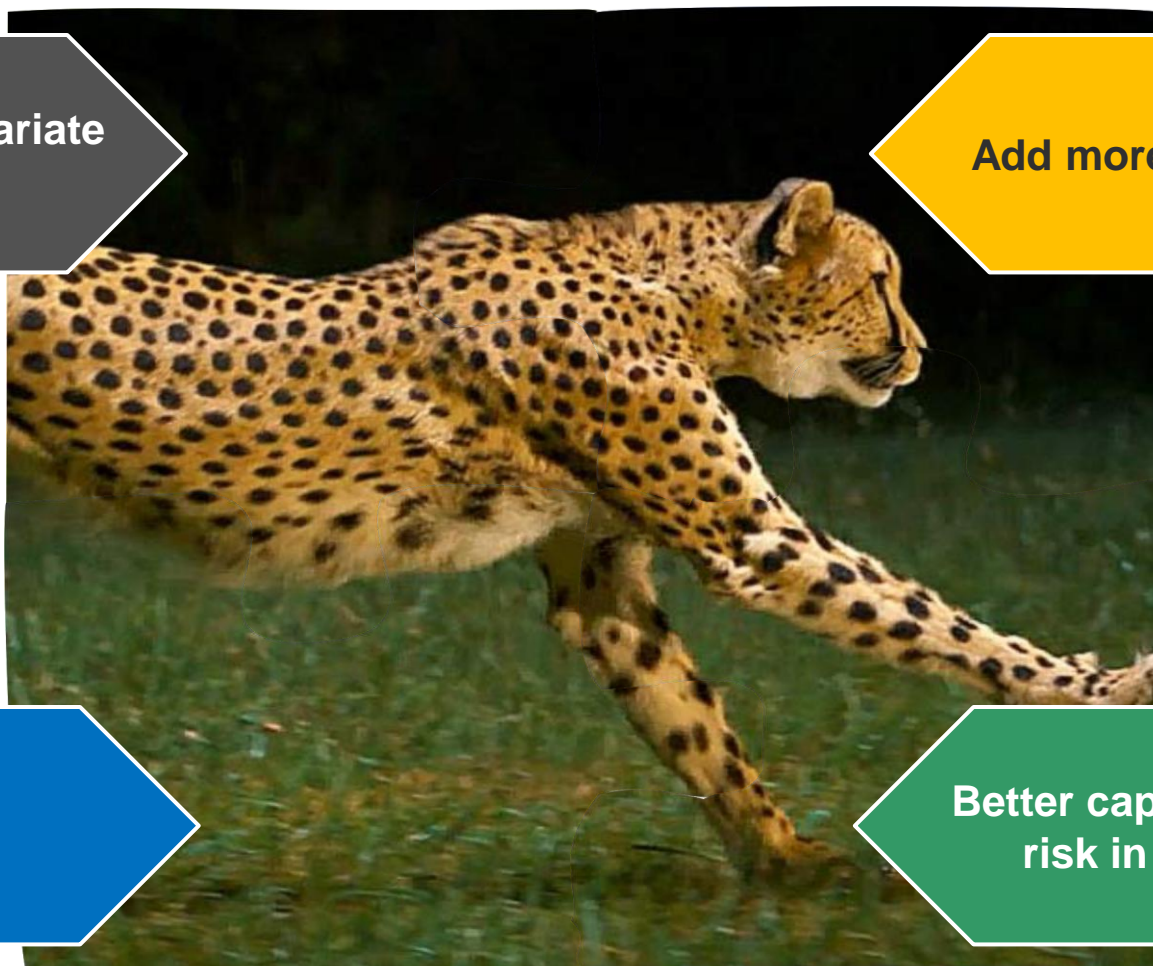
Requires a combination of market knowledge and subjectivity

Move to a multivariate structure

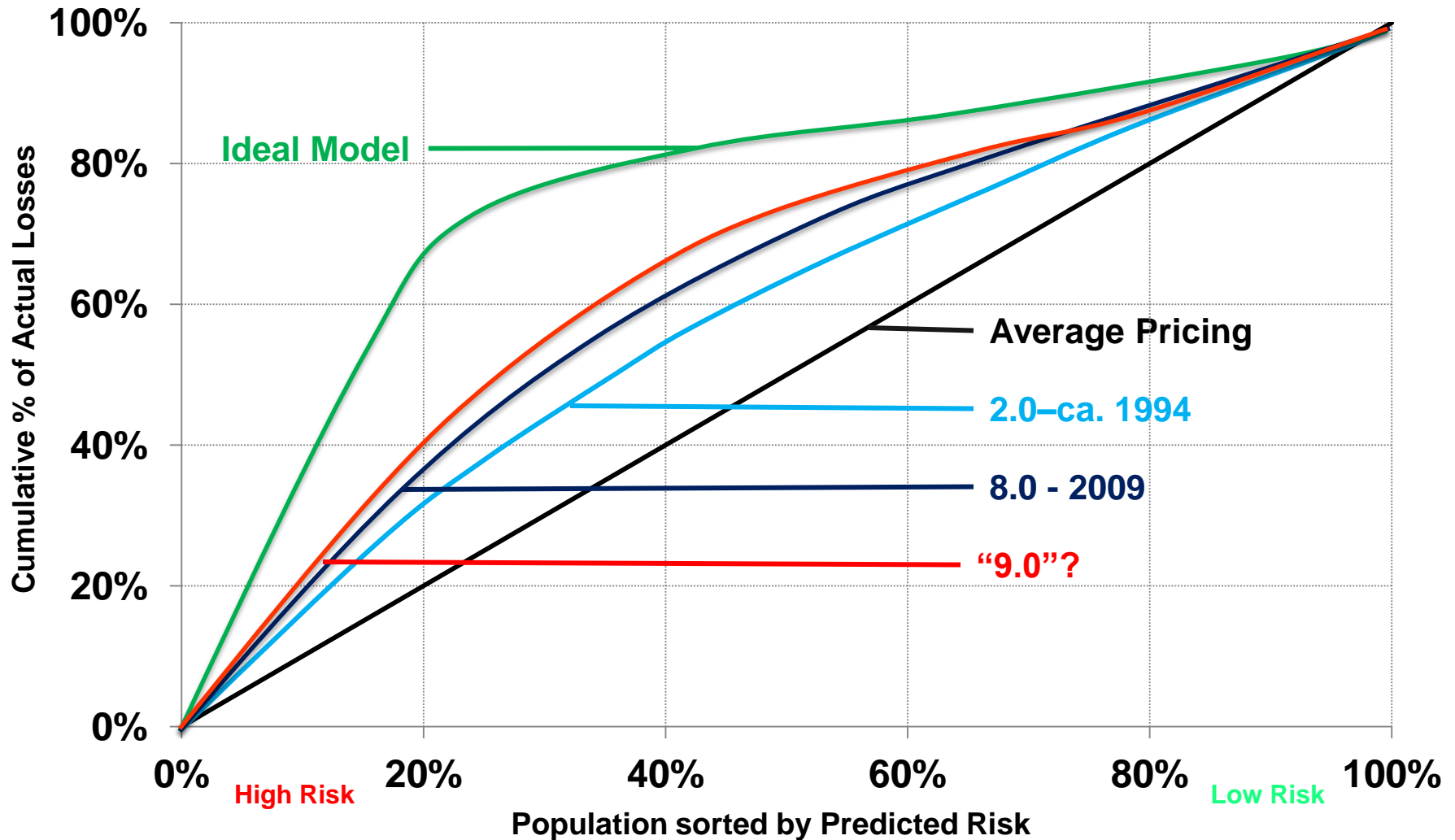
Add more interaction

Enhanced methodology

Better capture rate of risk in top deciles



How does Progressive view improvements to price segmentations?



Source: From Progressive's 2010 handbook (investor presentation)

We can enhance current segmentation in the following 4 ways



1. Better Technique

- Non-parametric techniques (RF, GBM) are showing promise



2. Existing Data

- Leverage existing data better by creating complex interactions



3. New Data

- Innovative data sources (Telematics, Traffic density, Social data etc)

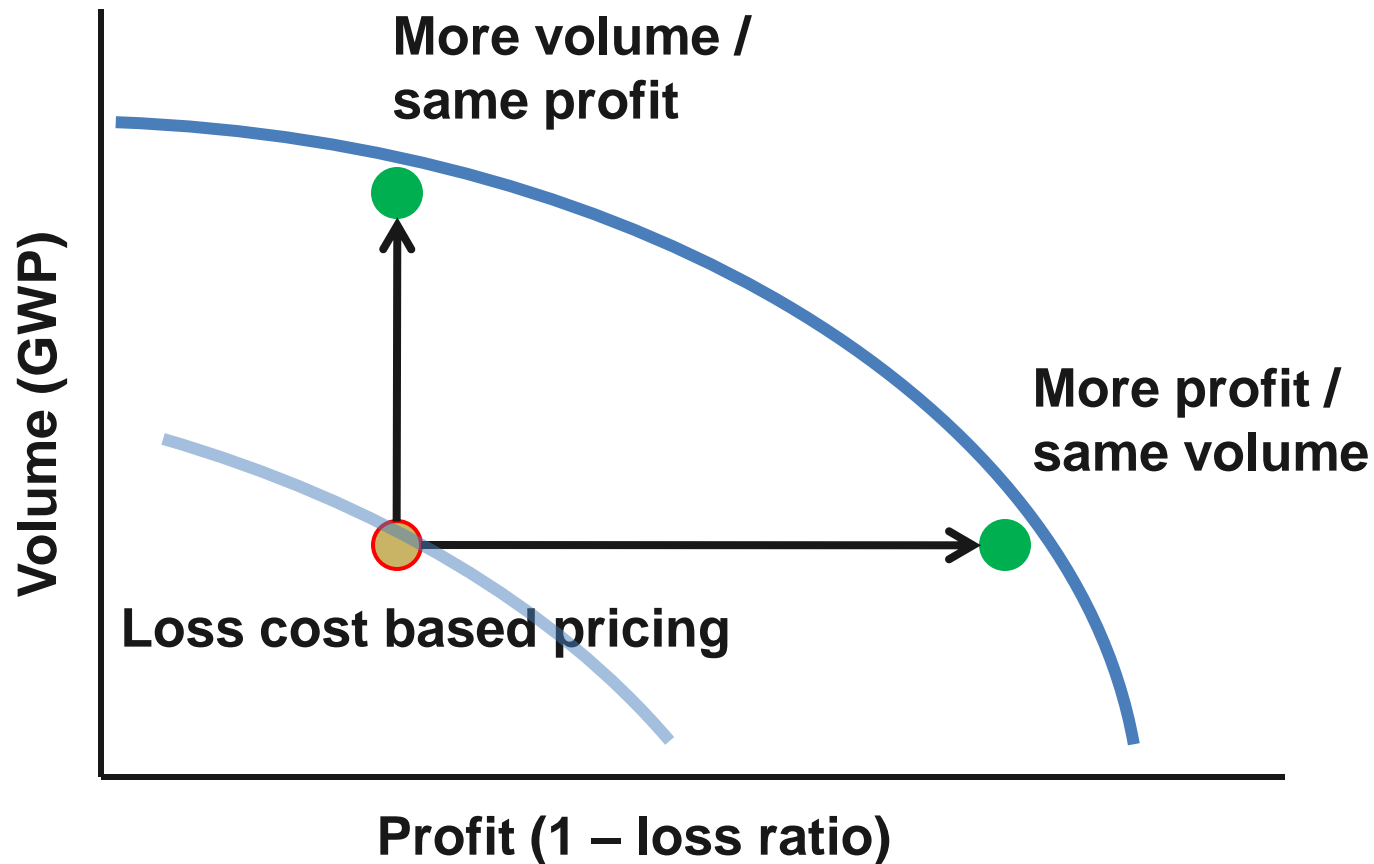


4. Beyond Cost Plus

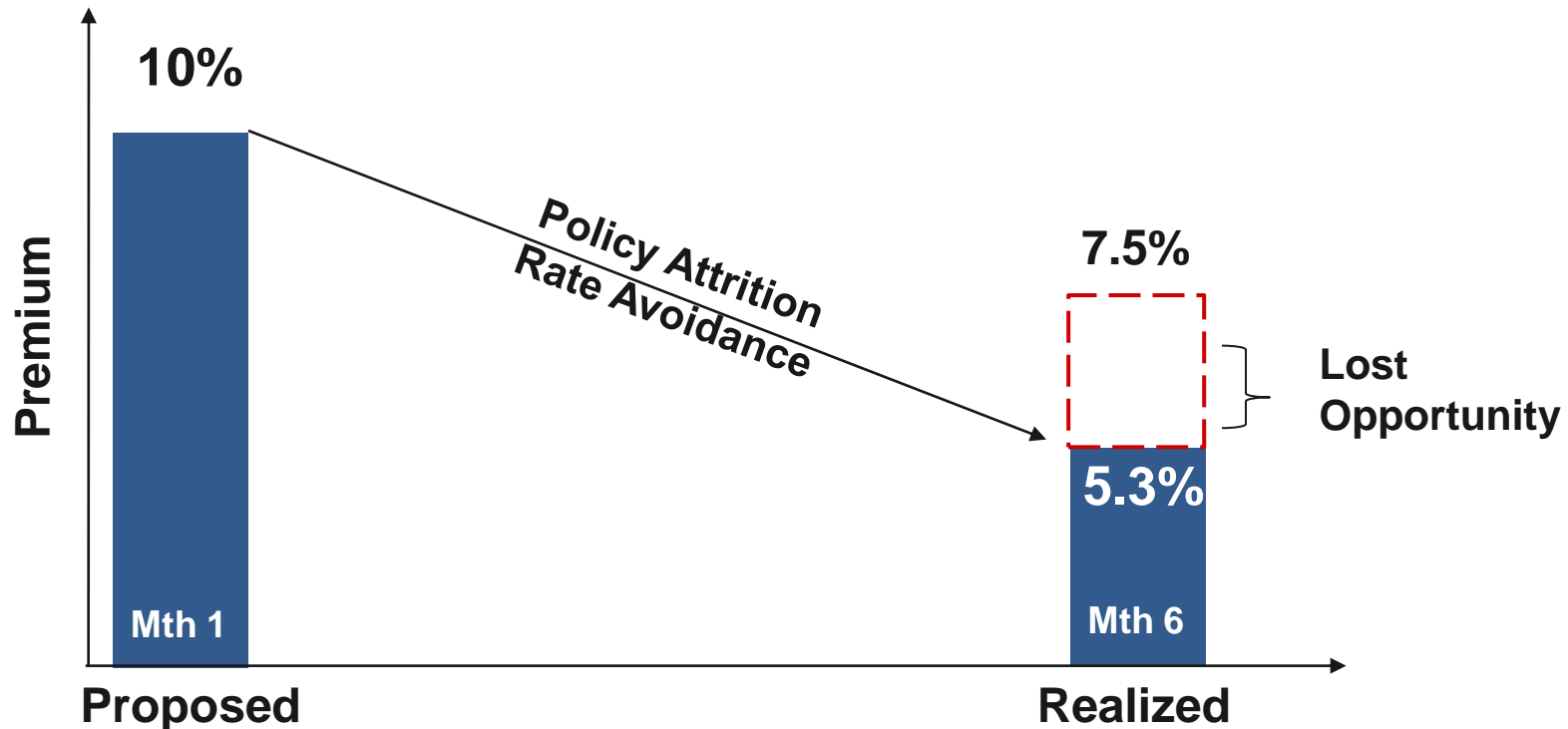
- Incorporate customer characteristics (elasticity and LTV) into pricing

Elasticity based pricing & optimization is a well known concept in the insurance industry

It is about reaching the efficiency frontier



Why is Elasticity Based Pricing important?



Elasticity Based Pricing has huge potential to improve both top-line and bottom-line

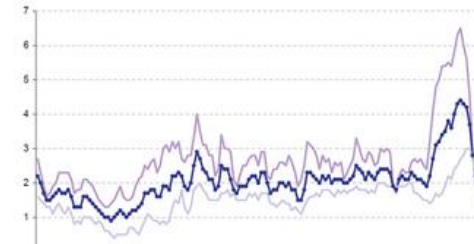
European insurers leverage elasticity in pricing

Selective Discounts

A 3D rendered green text '-20%' with a slight shadow and reflection on a white surface.

Discounts are offered at point of sale purely based on elasticity

Frequent Rate Changes



Prices are changed rapidly, some times multiple times in a day

Price Testing



Insurers experiment with prices in the marketplace to create data for elasticity

UK market regulations make it easy for insurers to leverage price elasticity

In the US, elasticity had not been widely used in the past because of...

Regulatory requirement



- No price testing
- Price parity
- Timeframe in which rates can be taken

Data hurdles



Lack of good data, inability to price test

The wait is over

- We can capture part of the gain within the regulatory framework
- People like us are already doing this

...But 'intuition led' Elasticity Based Pricing is common

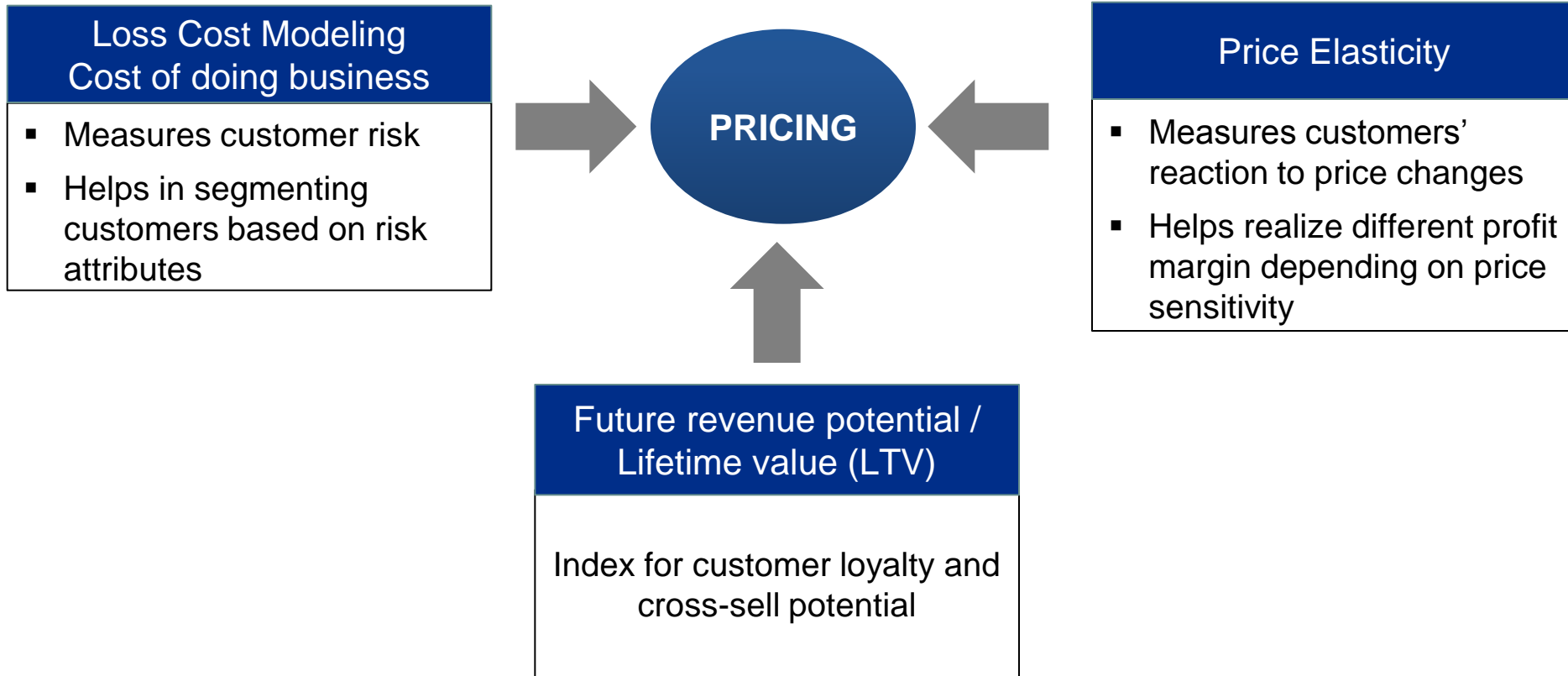
- Aren't factors frequently revised after meeting the sales team?
- Isn't actuarially justified discount such as persistency discount overridden?
- Isn't rate capping used frequently to avoid disruption?

What is the rationale for such "intuition led", "common sense led" decisions?

What if we could make these decisions more data driven?

We often override pure loss cost in favor of more revenue

Scientific Elasticity Based Pricing requires three essential components



This helps insurers go beyond 'cost plus' pricing model and incorporate key customer characteristics

...And requires a lead time of up to a year



- Policy & Quote data
- Factors used in pricing
- Factors used in relativities
 - Current
 - Proposed
 - Indicated
- Pricing engine
- Competitor data

- Policy level elasticity data
 - Estimated renewal/conversion
 - Estimated renewal premium
- Policy level LTV data
 - Estimated survival
 - Estimated future cross-sell
- Elasticity & LTV measurement at various price changes

**It takes ~6 months to build elasticity & LTV capabilities.
It takes an additional 6 months to run a pilot and validate results.**

Traditional definition of price elasticity is what we read in text books

Definition

% change in quantity demanded for a 1% change in price

Formula

$$e = \frac{\Delta Q / Q}{\Delta P / P}$$

Estimation Method

Price testing: Change prices to monitor demand change

Examples

- Oil, rice, salt inelastic (0.4- 0.6)
- Pleasure travel elastic ~ 1.5

...However, in the US insurance context, this concept deviates widely

...By book type

New vs. renewal business

...in its definition

$$e = \frac{\Delta EP / EP}{\Delta P / P}$$

...in the methodology






No price testing and lack of reliable competitive data

...and is not a point estimate

Elasticity is a function of current premium the magnitude of change

P is premium; EP is earned premium

...however estimation is not all that complex

		Customers				
		Dasher	Dancer	Cupid	Comet	Rudolph
Premium change in %age	-20%					
	.					
	0%					
	5%					
	.					
	.					
	+20%					

Back of envelop math

- Assume 3 year data
- ~ 5 MM annual policies
- Annual price change & 80% renewal

Results in

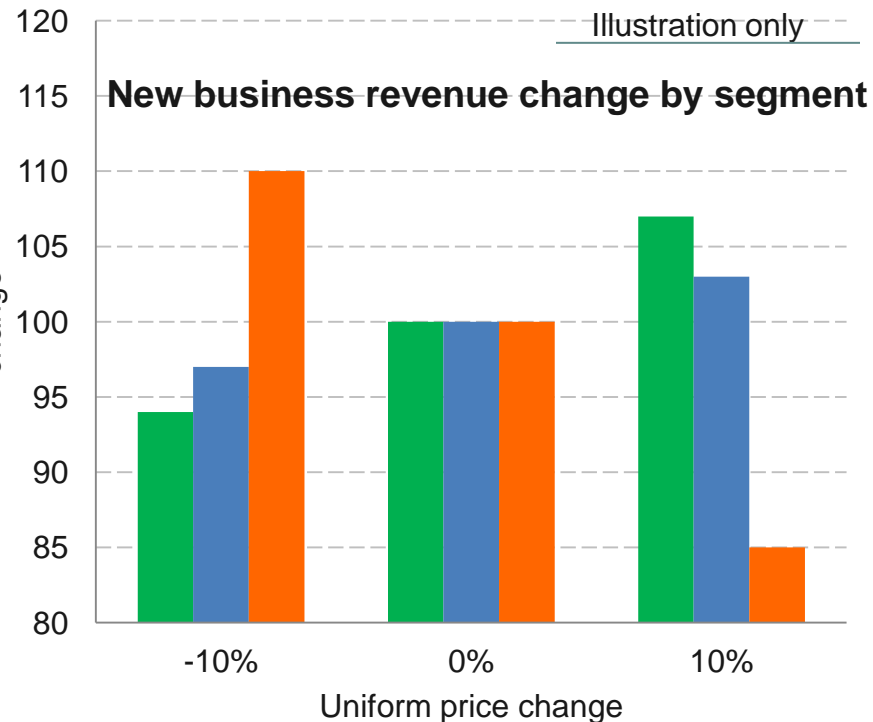
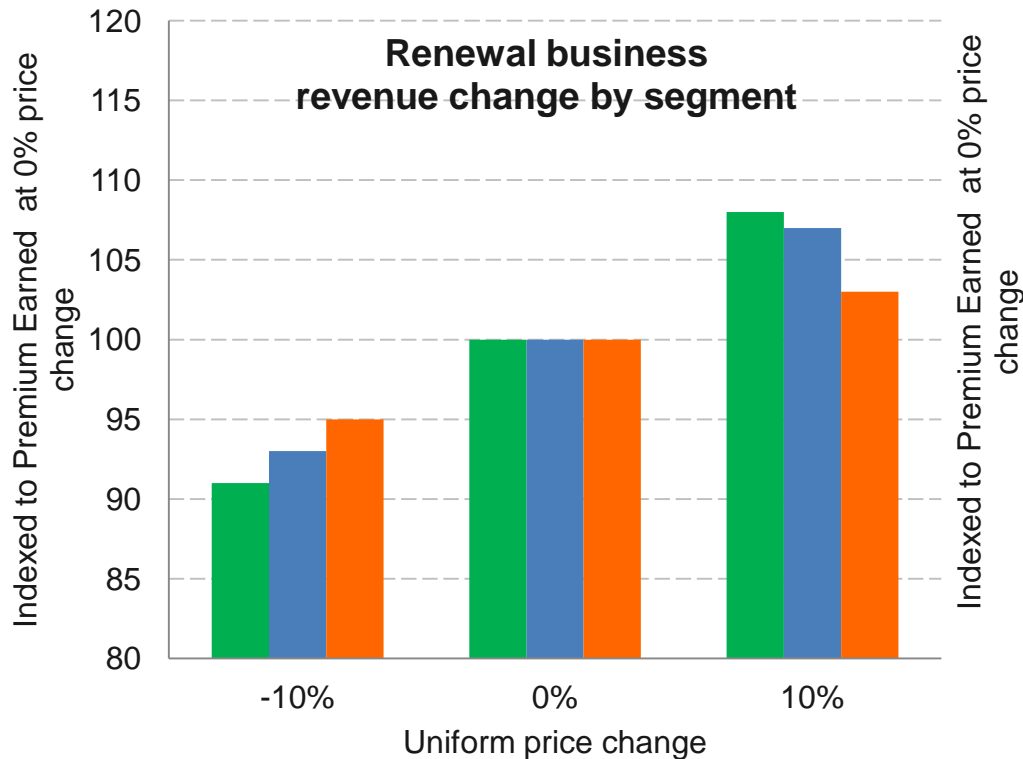
- ~ 7.8 M customer
- 2 data points / policy
- 5% of cells populated

Our goal is fill this sparse matrix... Doable?

An ensemble of models is built to predict the probability and magnitude of each response

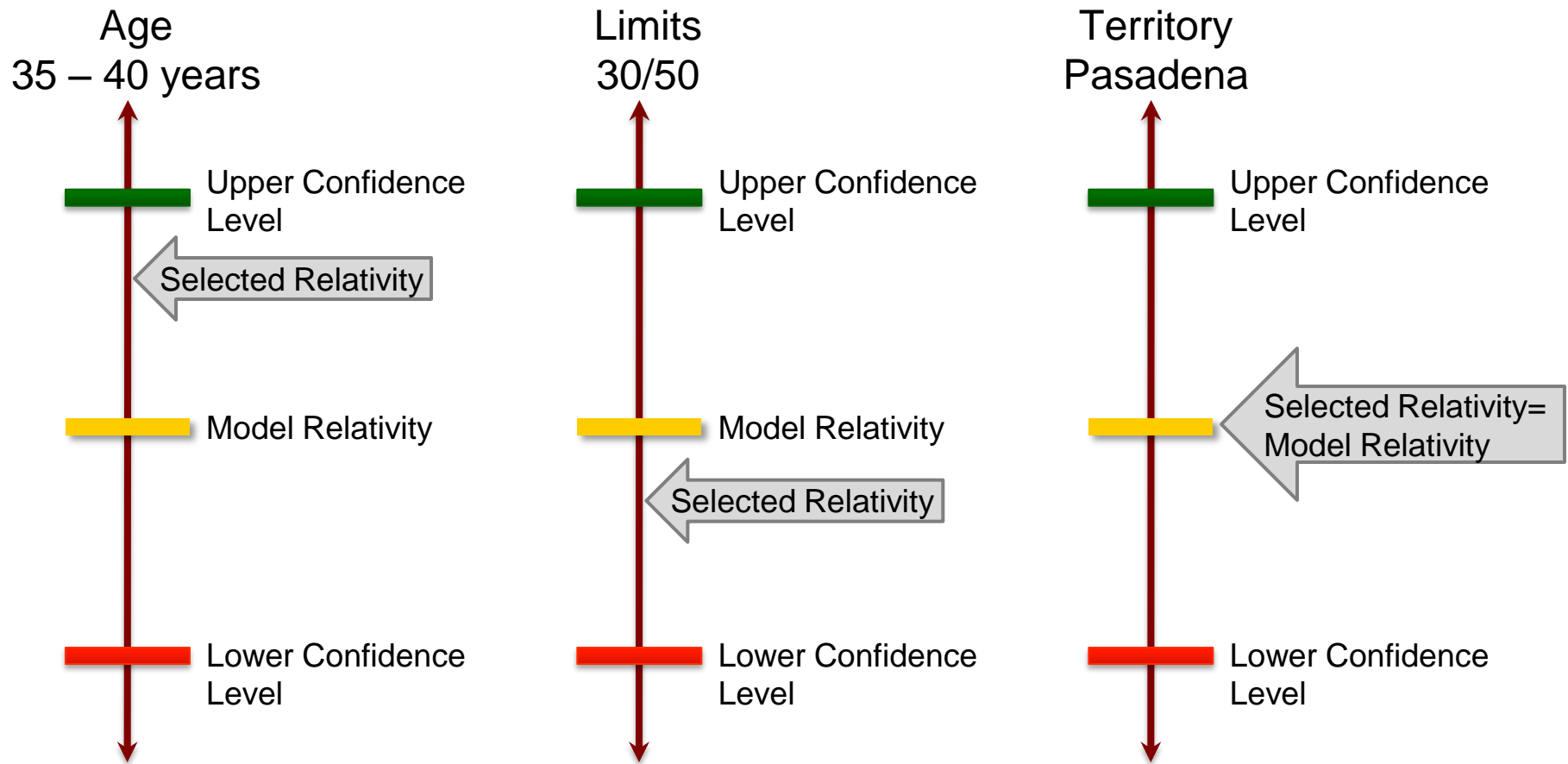


Customers exhibit varying tolerance towards price changes



New business customers are more elastic than existing ones because they tend to shop with multiple carriers before making a decision

We can optimize prices by varying a limited number of rating factors using elasticity & LTV



Elasticity & LTV provide new insights about the customer. This can help us select “better” relative values.

Tests show that this approach works

Case Study: Simulation results from a large P & C insurer in the US

Parameter	US Regulatory Scenario	UK Market Scenario (-10% to +10%)
Average premium change	0% (by design)	0% (by design)
Number of policies	+0.9%	+3.7%
Written premium	+3.5%	+9.7%
Loss ratio	-1.0%	-2.3%

Better retention & better top line growth, while remaining risk neutral

Other benefits include better forecasting and objective decision making

Rate capping



Forecasting



Framing the Distribution - Product debate



In Summary...

- ▶ Optimization techniques have evolved to incorporate elasticity
- ▶ Due to limited regulations and potential upside, European companies have been early adopters
- ▶ US insurers are realizing the value of elasticity led optimization
- ▶ While the accrued benefits may not be as high as in the European scenario, there is money to be made within regulatory constraints
- ▶ It takes a year to build this capability and go to market with it

Thank You



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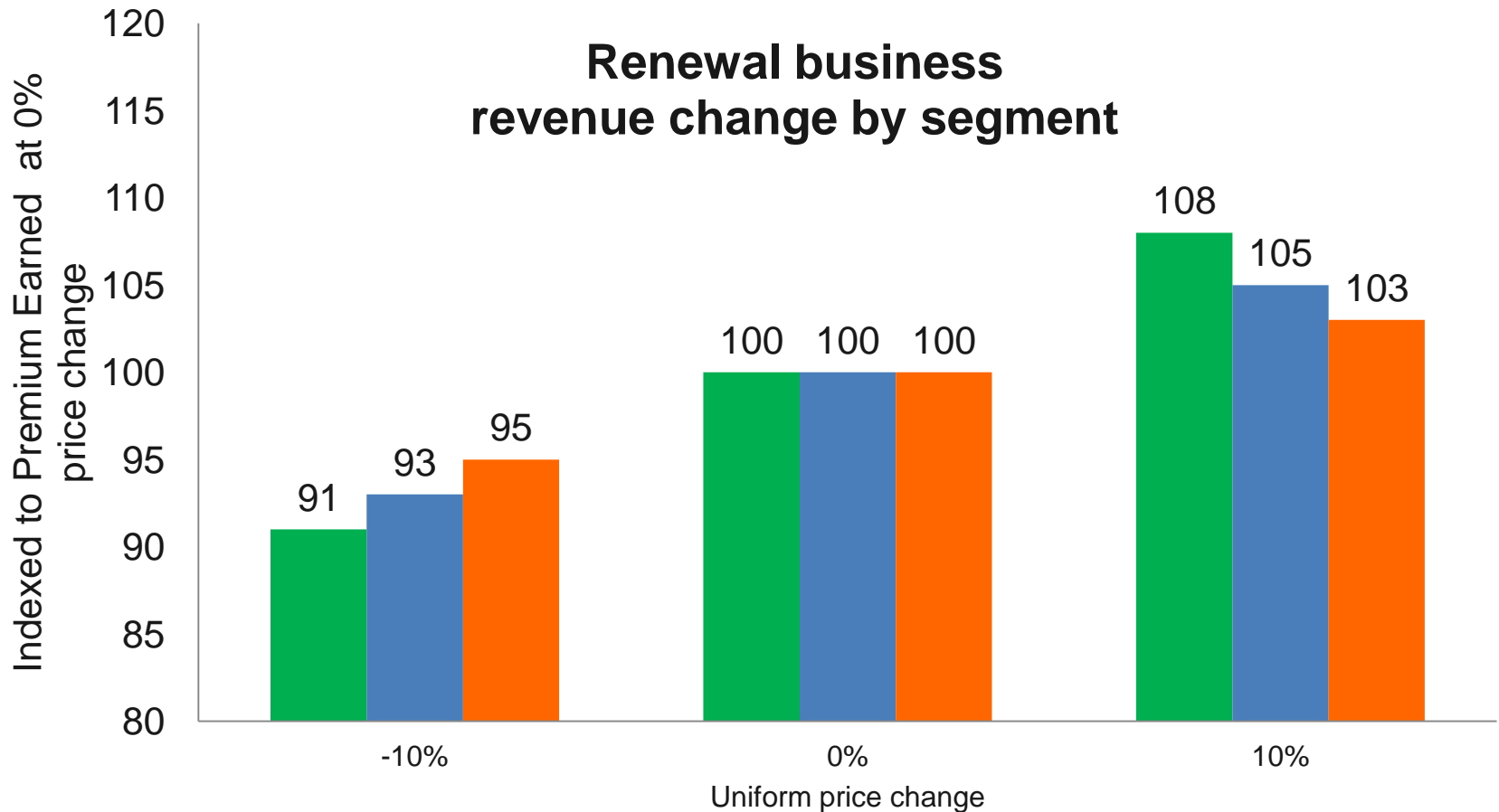
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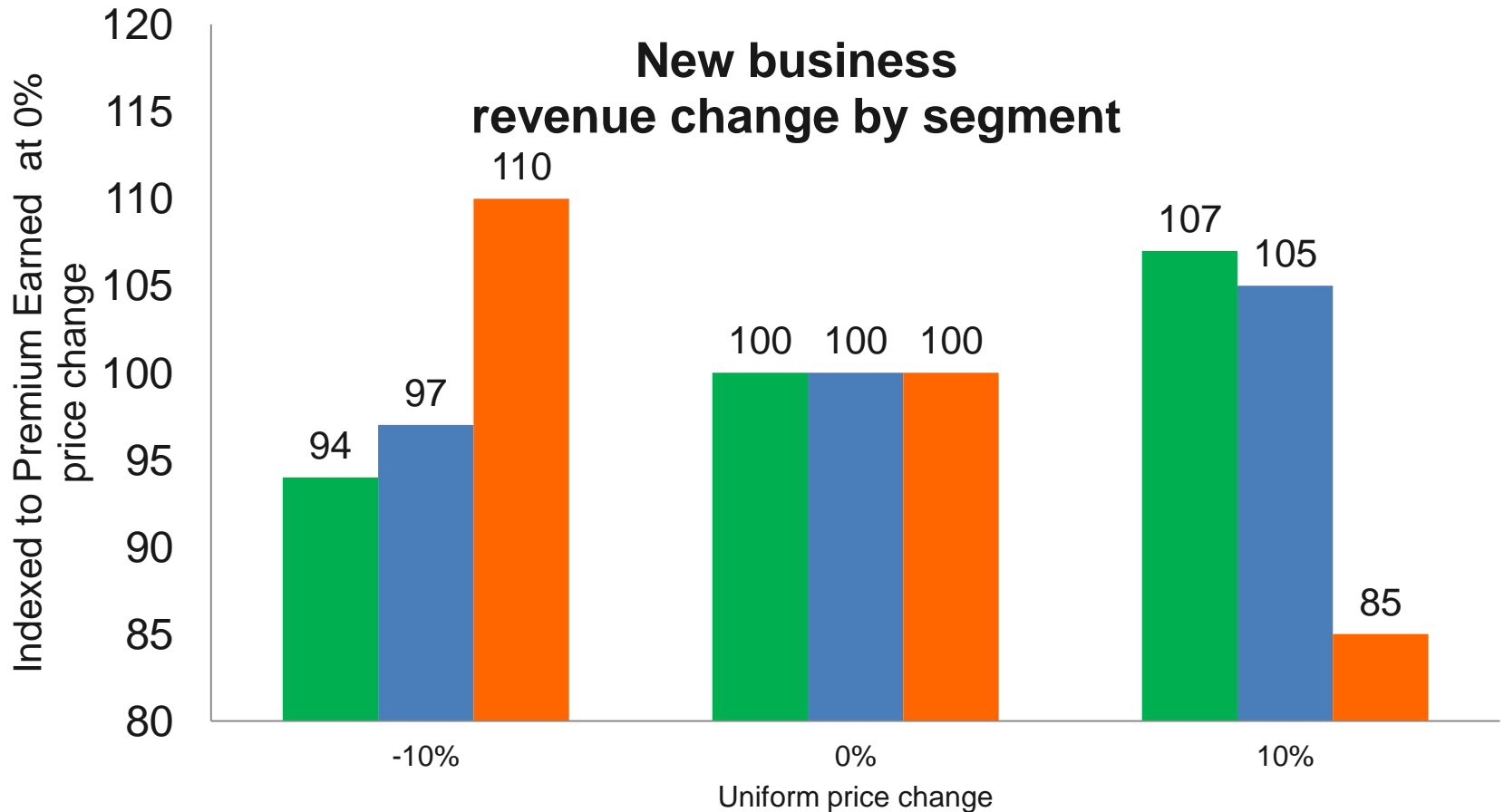
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Illustration only



Customers exhibit varying tolerance towards price changes

Illustration only



Segment A- Least Sensitive



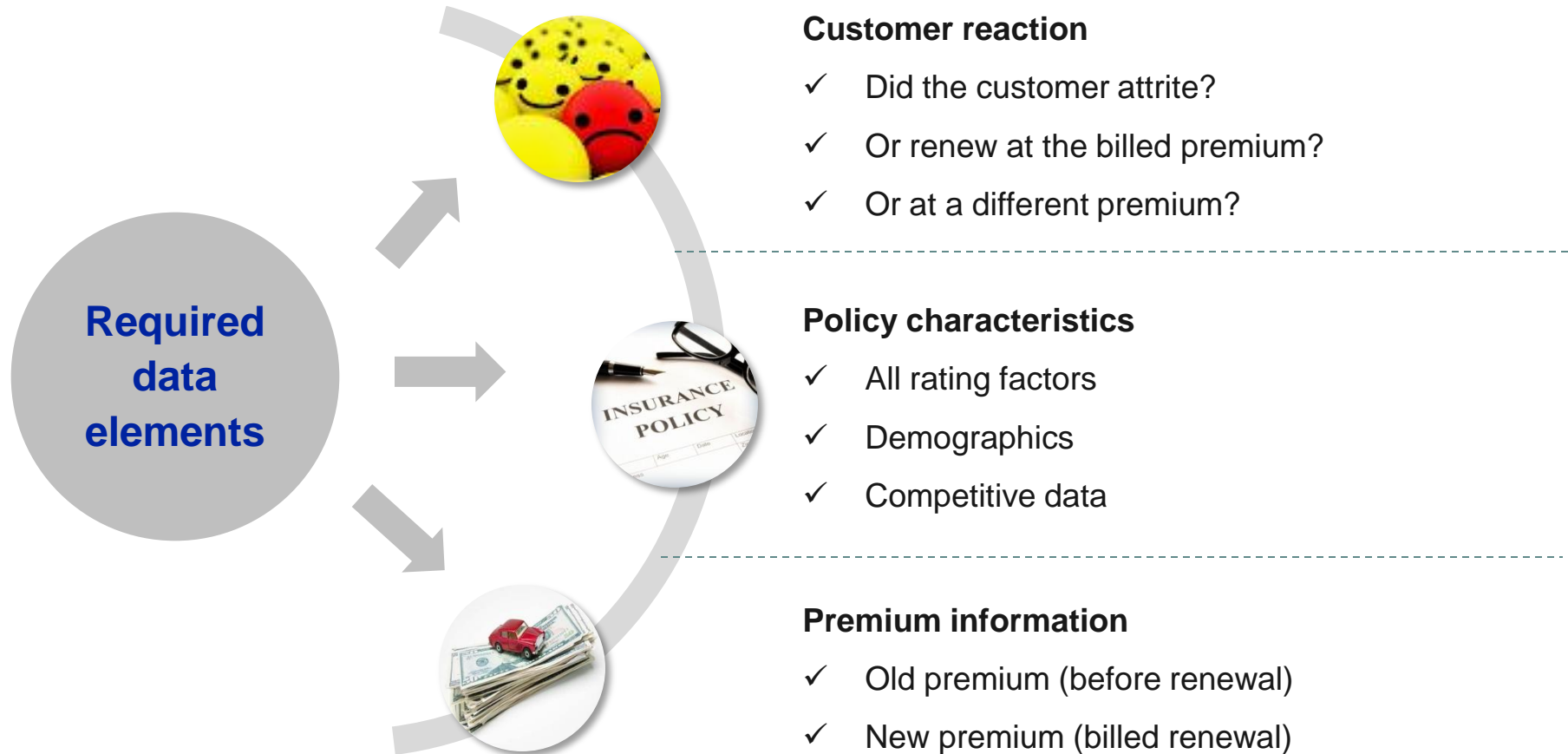
Portfolio Average



Segment B- Most Sensitive

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To estimate renewal elasticity, we need historical data about policy renewals



To estimate new business elasticity, we need historical quote data

