a.s.r.
de nederlandse
verzekerings
maatschappij
voor alle
verzekeringen

a.s.r./aegon car churn case

About us

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a.s.r. is a leading Dutch financial firm

- It provides life insurance, non-life insurance, pensions, mortgages, and other financial products in the Netherlands.
- With around 1.8 billion in premium volume each year, the P&C branch of a.s.r. is the 3rd player in the Dutch market.
- It has recently acquired the Dutch division of Aegon, while Aegon group has acquired a 30% stake in the resulting company
- With over 7000 jobs in the Netherlands, it offers multiple challenging jobs for econometrics students on the intersection of finance and commerce.

a.s.r. hosts a centrally organized data science department, Data Science & Pricing

- This department focusses on commercial pricing of financial products, process optimization, and many more topics
- Recently, we have been working mainly on commercial pricing of financial products for, amongst others, the P&C business line.
- As you can imagine, many econometrically interesting cases come our way!

Pricing insurance products such that cost coverage and profit are maximized requires a strong pricing process

Situation

Pricing insurance products is tough.

- Costs of selling an insurance need to be estimated based on past claim realizations and are subject to estimation uncertainty.
- Additionally, the probability and severity of claims are not constant over customer tenure, so marginal costs for the same customer can dynamically change.

Complication

It is hard to set prices such that fixed costs are adequately covered and a good profit is made.

- On the market side, competition is strong and adverse selection risk is prevalent.
- Pricing too high means hardly any customer will buy insurance
- Pricing too low means many customers buy insurance but add bad margins.

Question

So how to do this right?

- Any durably successful solution will require a strong pricing process with:
  - claim models
  - elasticity/retention/churn models
  - a procedure to maximally leverage the model information in setting the prices.

Price optimizations maximize profit and/or GWP using actuarial costs, competitor prices, and elasticities

Costs, Competitor and Customer make up the pillars of price setting

Inputs: costs, competitor and customer

Costs: defined by the actuarial department in the actuarial model

Competitor: competitor prices

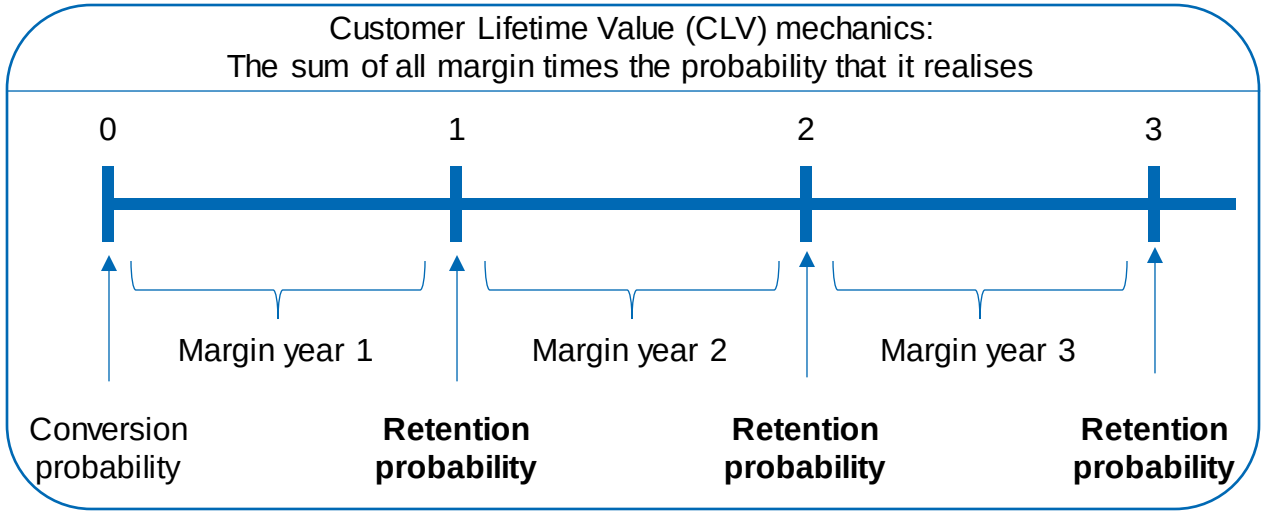
Customer: price elasticity models for new and existing customers

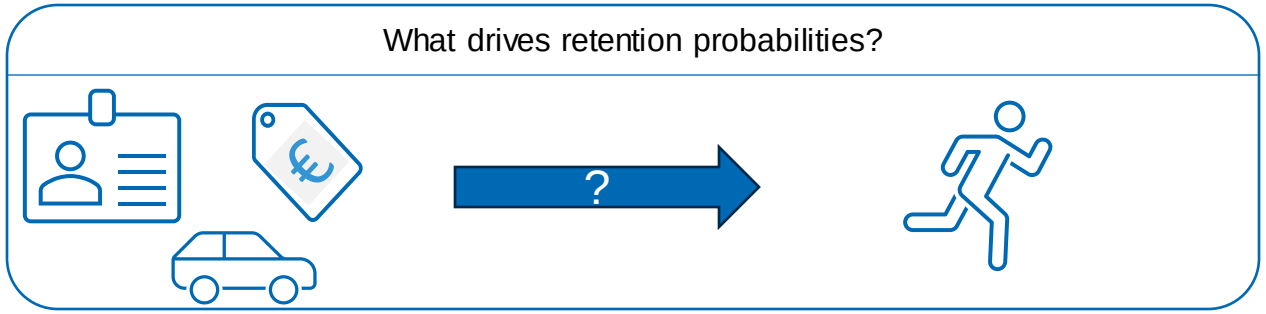
Result: The 'Prijsfabriek' optimizes commercial list prices and welcome discounts in a fast and controlled manner, boosting GWP and profit

Listprice adjustments

Welcome discounts

The analytical challenge is to build a retention/probability model for car to be used in price optimizations





An important margin metric is Customer Lifetime Value (CLV)

- CLV is the expected value of the sum of margin over all years a customer will stay at the company.
- It decomposes amongst others into a series of retention probabilities

These retention probabilities are the ones of interest for modelling in this project. The model should answer:

- How are general churn levels related to customer and object characteristics
- How does the likelihood of churn change when prices change?

Additionally, we are interested in the following related aspects:

- To what extent can we draw causal conclusions on the effect of price changes on churn?
- What metrics would you propose to judge model performance and how well do the models perform?
- What techniques would you propose to use to make the model understandable and explainable to our stakeholders?
    - Main drivers
    - Interactions
    - Contributions of explanatory variables on forecasts
- What (a priori) metric of forecast uncertainty would you suggest to get an idea of how much faith to put in a forecast?

The dataset provides information of car policies over time

policy_nr_hashed	years_since_policy_started	d_churn	d_churn_cancellation	d_churn_between_prolongations	d_churn_around_prolongation	premium_main_coverages	...
JoRr68	13	0	0	0	0	1888	…
JoRr68	14	0	0	0	0	1979	…
JoRr68	15	1	0	0	1	2206	…
L63zwL	13	0	0	0	0	1950	…
L63zwL	14	0	0	0	0	2185	…
L63zwL	15	0	0	0	0	2228	…
L63zwL	16	0	0	0	0	2293	…
L63zwL	17	0	0	0	0	2486	…
apPGq9	16	0	0	0	0	2707	…
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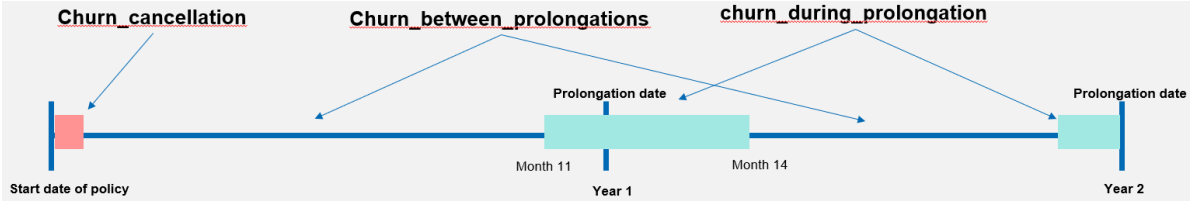


The table on the left provides a stylized view of the car dataset used for the case

- The dataset shows the development of car policies over time
- The cross-sectional policy dimension is identified with the policy_nr_hashed, the time-series dimension with years_since_policy_started.

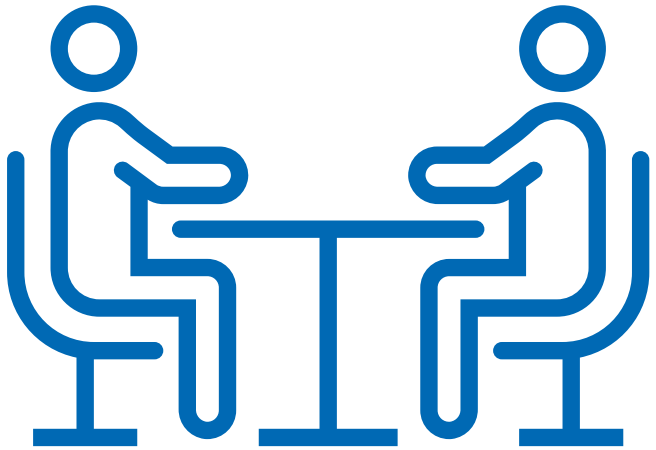
The dependent variable of interest is churn which contains information on whether a policy churned in a specific year.

- If deemed interesting/relevant, churn is split out across moments in the year in the following variables:
  - d_churn_cancellation
  - d_churn_between_prolongations
  - d_churn_around_prolongation

The independent variables contain various types of information

- Premium information contains premium (total and split out across main vs subcoverages), welcome discount information, action/control group information, and premium changes during the year due to mutations
- Customer/channel information entails age, pc4 and channel
- Car information contains value, age, brand, type, weight, fuel;
- Coverage information contains main coverage, number of coverages, and mutations

Practical details around getting started, organizing contact moments, and questions



As you will be working with anonymized customer data, it is important to handle the data carefully

- In practice this means:
  - the data can only be shared via a special environment (msafe) that we will set up, and not via other means (e.g., mail, chat, etc.)
  - that you delete the data after you have completed the case
  - That you sign a non-disclosure agreement (NDA, has been checked with your professor in advance)
  - And in general don't share information outside your case teams, your professor, and us.

So after the conclusion of the presentation, please:

- Sign the non-disclosure agreement (NDA) and hand in
- Leave your email address and telephone number with us for the msafe environment

How would you like to have follow-up meetings or contact moments organized?

Are there any questions/remarks/etc.?