Reacfin

ACAM

Evolution of mobility pricing

24TH NOVEMBER 2023

SPEAKER'S INTRODUCTION

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CEO Reacfin and IA|BE qualified actuary

Expert in Non-Life and Health insurance (pricing, product development, reserving and risk management) and Data Science.

Reacfin Consulting

We offer consulting services in actuarial science & quantitative finance, including a.o. capital - portfolio - product - risk - and liquidity - management. We build our expertise on broad data science capacities.

Reaxii

We co-develop solutions with our clients, i.e. we integrate our solutions in our client's systems and processes and we secure full knowledge transfer (e.g. open source code).

Reacfin Academy

We share our knowledge with our clients. We offer a comprehensive learning platform, including on-site trainings, e-learning modules, webinars etc.

AGENDA

Trends in non-life (motor) insurance

Creative sourcing and usage of data

Focus on Electric Vehicles insurance

Conclusion

TRENDS IN NON-LIFE (MOTOR) INSURANCE

Challenges in non-life insurance

Increasing competition

- Commoditisation of insurance products
- Pricing comparison systems
- Sophistication in pricing
- Insurtechs simplifying products/processes

Availability of new data sources

- External data (IoT, open data,…)
- Use of unstructured data

New customers needs and behavior

- Digitalisation of underwriting process
  Direct vs Brokers
- New risks emerging
  Sustainability
  Mobility needs
- Focus on price (made possible thanks to pricing comparison systems)

To adress these challenges, Insurers have to

- Innovate in product development and surrounding services
- Capture and identify relevant features for pricing models
- Adapt faster to market changes (identification of risks, building new models, faster product deployement)
- Improve processes (e.g. claims management) to increase added-value to clients.

TRENDS IN NON-LIFE (MOTOR) INSURANCE

What are the key success factors for non-life insurers to face these trends and challenges?

Competitive advantages in the future

- Creative sourcing of data (new sources of external data, behavior-influencing data monitoring,…)
- Creative usage of data (features selection, features engineering,…)
- Distinctiveness of analytic methods beyond actuarial sciences (NLP, image processing, big data,…)

Build a data-driven culture

- Leadership: set clear goals and decide what success looks like
- Decision Making: base decisions on evidence not on gut feeling
- Company Culture:
  Don't ask "What do you think"?
  Ask "What do you know"?

Technology changes much faster than people

- Insurers should not only invest in analytics and IT technologies
- Key to train & motivate their highly skilled business experts & data scientists to adopt the newest tools
- Make sure people use Advanced Analytics with creativity, confidence and consistency

TRENDS IN NON-LIFE INSURANCE

Digitalisation and availability of data makes possible the use of other business models

On-demand insurance

- Insurance coverage adapted to customers' needs when asset is actually in use and at risk
- Aims at targeting young clients who have different habits and ask for more flexibility

→ **Towards service model (renting instead of owning)**

- For car insurance: temporary coverage (typically 1h to 28 days)

E.g.: Cuvva, Trov, Slice…

Usage-based insurance

- Pricing methodology based on client's habits rather than on the type of risk they belong to
- Based on new data sources (e.g telematics for cars)
- For car insurance
  - Pay-As-You-Drive (PAYD) : depending on mileage
  - Pay-How-You-Drive (PHYD) : depending on driving style

E.g.: InsureTheBox, Ticker, ByMiles, a lot of traditional insurers…

Sharing economy insurance

- One of the largest growth area of insurance solutions in the coming years
- More flexible insurance solutions are needed as the distinction between personal and commercial usage has blurred
- Even peer-to-peer insurance models have been considered

E.g.: Dinghy, SafeShare, Slice Labs,…

Embedded insurance

- Insurance contracts added to purchase of non-insurance items (e. g car insurance coupled with purchase)

→ **Not a new trend, yet it is likely to extend quickly along with change toward sharing economy and insurance as a service**

- Manufacturers develop this business model

E.g.: BlaBlaCar, Uber, Tesla,…

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CREATIVE SOURCING AND USAGE OF DATA

There exist 2 main categories of data

- Structured data :
  organized and well characterized data that are easy to use because they are well identified.
  - E.g. insurer's policies and claims data
- Unstructured data:
  non-organized data not easy to manipulate and which require much preparation (everything else).

80%

Of business information are unstructured

Unstructured data

PDF files

Websites

Social media

Word files

Emails

Mobile data

Sensor data

Structured data

Commercial data

Open data

Model calculations

CRM

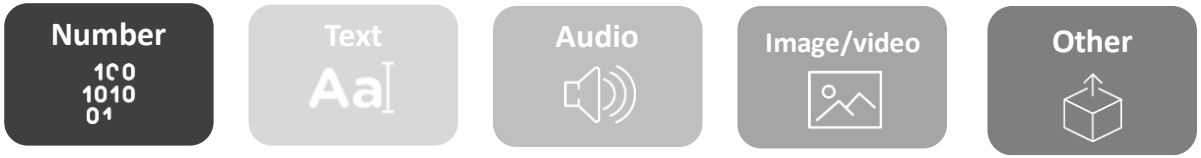
Purchased databases

Data warehouse

CREATIVE SOURCING AND USAGE OF DATA

Different sources and types of information

- Numerous sources of internal or external data
- Data type is different from one content to another



Increasing complexity to collect and manage unstructured data

	Internal data	External data
Unstructured data	PDF files Word files Emails	Websites Social media Mobile data Sensor data
Structured data	Commercial data Model calculations CRM Data warehouse	Open data Purchased databases

CREATIVE SOURCING AND USAGE OF DATA

New sources of data

- Additional data can be obtained through many different sources :

1. **Scraping/parsing techniques:**
   - Extract information automatically from websites
2. **Open data files:**
   - Structured datasets available to everyone
3. **IoT sensor and API technologies:**
   - Connected objects and application programming interface
4. **External data providers**
5. **Look twice into your own unstructured data:**
   - Reveal hidden information from core data

Data Science can help enhancing the data collection

CREATIVE SOURCING AND USAGE OF DATA

How to enhance data

- Once additional data has been collected, new methods and algorithm allow to get the most out of it. Among others:

1. Statistics, ML and feature engineering:

Create structured dataset using initial datasets or charts to understand data

2. Text mining, NLP and LLM

Process of examining large collection of written resources and methods to perform linguistic analysis and/or generation

3. Image processing

Techniques to perform operations on images to enhance its content or extract information

CREATIVE SOURCING AND USAGE OF DATA

Case study: Telematics - Context and overview

- Development of connected cars :
  - Advanced Driver-Assistance Systems (ADAS) have become increasingly useful and have helped reduce claim frequency
  - Most common tools :
    - Park Assist
    - Forward Collision Warning
    - Blind Spot Information
  - 350M connected car expected in the world in 2023
- Telematic-based insurance has been spreading over the last few years :
  - Italy has relied on telematics for 20 years :
  - Other countries are catching up :
    - EU initiatives such as eCall tend to promote connected vehicles, IMCO's new vehicle safety standards
    - Not so popular/widespread in Belgium as in other countries like UK, France or Germany
- New opportunities for pricing :
  - Telematics may provide new kinds of data helping insurers improve customers selections and place it at an advantage over competitors.
  - They allow for new and personalized pricing methods such as :
    - Pay-As-You-Drive (premiums depend on when and where policyholders drive)
    - Pay-How-You-Drive (premiums are affected by insureds' driving behaviors)

CREATIVE SOURCING AND USAGE OF DATA

Case study: Telematics - Opportunities with telematics

- For insurance companies :
  - Collection of useful and large datasets
    - Location : where do drivers use their cars?
    - Time : when do they use their cars? In the daytime, during the night, what kind of weather…
    - Driving style : how do they use their cars? Measures of speed, sudden braking…
  - Improvement of insurance services :
    - Easier claim processes especially if telematics are connected to phone applications
    - Useful advice sent to customers (e.g. in case of dangerous weather conditions, fuel management,…)
  - Reduction of expenses and claim frequencies :
    - More effective claim management processes
    - Auto-selection for safer driving habits
    - Prevention of fraudulent claims and car theft
    - Tying premiums to mileage makes insureds drive less

- **Individual pricing**
- **Better understanding of risks**
- **Lower asymmetry of information**

- **Customer Retention**

- **Improved loss ratio**

CREATIVE SOURCING AND USAGE OF DATA

Case study: Telematics - Opportunities with telematics

- For clients :
  - Enhanced communication with insurer
  - Improved claim experience :
    - Digitalized and automatized claim processes via smartphone applications…
  - Additional safety :
    - Reduction of risks of theft of new and expensive cars
    - Real-time tracking of fleets
  - Premium discounts :
    - Compensation to the insureds for collection of data by the insurer

Strengthened customer's satisfaction

CREATIVE SOURCING AND USAGE OF DATA

Case study: Telematics - Issues and threats related to the spread of telematics in insurance

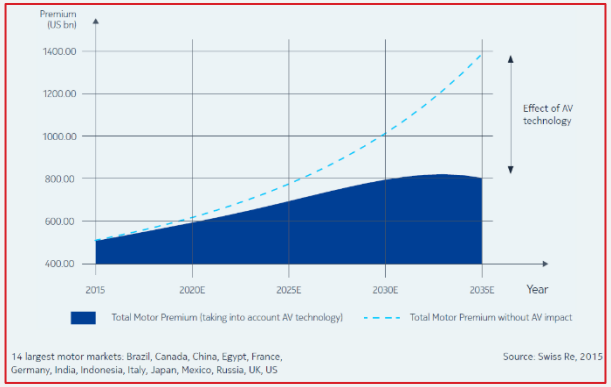
- Insurers need time to process and benefit from this collection of new data:
  - These datasets are very different from traditional self-reported variables used for pricing (e.g. age, car model, postal code…)
  - UBI is a very different pricing methodology : real-time pricing not only relies on past claims history and characteristics of policyholders but also adapts to current behaviors

- Concerns about private data collection :
  - So far, some profiles of drivers are more willing to use telematics than others (e.g. young people accustomed to data collection and digitalized services)
  - Drivers are really looking forward to using connected devices for their own benefit, but not always ready for insurance utilization
  - Clients may ask for compensation in return for data collection (such as premium discounts)

CREATIVE SOURCING AND USAGE OF DATA

Case study: Telematics - Impact of telematics and autonomous cars on car insurance premium

- The spread of telematics and ADAS will help reduce costs and frequency of claims
  - Thanks to automated car technology leading to safer roads, motor insurance premiums for the 14 major markets could be trimmed by USB 600 billion by 2035*



- Studies have shown that using telematics may help reduce some costs and claim frequency :
  - In Italy (the first European country to promote usage of telematics), a study showed that black boxes have lead to 20% decrease in claim frequency and 6% in claim processes expenses **
  - Telematic-based insurance promotes safer driving styles (reduction in hard braking, hard acceleration, speeding ; drivers tend to adopt more eco-driving habits)

Telematics lead to both

- Adverse selection : good drivers are more likely to choose telematic-based insurance
- Reduction of risky behaviors

Yet, relevance of UBI should be questioned by taking into account all benefits (lower risk) and costs (cost of devices are borne by insurers)

* Swiss RE : The future of motor insurance, 2016

** Sergio Desantis and Gianni Giuli (ANIA)

CREATIVE SOURCING AND USAGE OF DATA

External and new data can be used to enrich the existing database with new attributes/variables

- **2 different points of view**
  - Data Scientist and Actuaries: enrich the existing database with a set of features which will be used when calibrating the models. More variables should lead to better predictive models (! Let's avoid overfitting !)

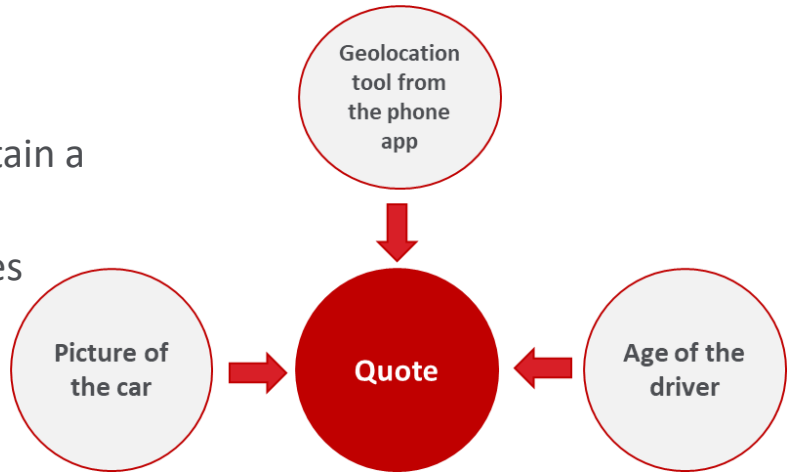
  - Business users (e.g. underwriter and marketing teams): simplify the models' results interpretation and/or the processes
    - e.g. reduce forms sizes in underwriting ➔ Quick quote

- **What happens if too much data?**
  - Need for feature selection: keeping only the most relevant variables
  - Potential for feature engineering: creating new variables to solve our problem

CREATIVE SOURCING AND USAGE OF DATA

Case study: simplifying quoting process – Quick Quote by Generali

- In 2018, Generali Belgium launched **Quick Quote Car** a phone app that helps new customers to obtain a car insurance quote within 60 seconds
  - The app is available for insurance brokers who can obtain a quote with the following data
    - Picture of the car : Image recognition technologies help identify the license plate and the main characteristics of the car
    - Geolocation
    - Age of the driver



NB: regulatory context has evolved since this initiative

- Later in 2018, Generali also launched a similar app (Quick Quote Home) to help brokers calculate home insurance quote based on:
  - Pictures of the house :
    - Based on collaboration with a start-up specialized in real estate valuation (Rockestate), a 3D simulation of the house is made
  - Geolocation

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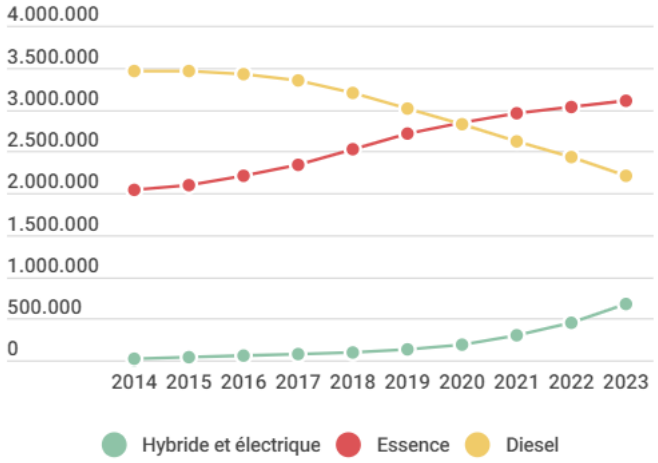
FOCUS ON ELECTRIC VEHICLES

Context

- As the electrification of the Belgian carpool keeps on intensifying, insurers must tackle the challenge of **adequately pricing** these new risks for which they barely have data.
- **EV's share** in Belgium in 2023 is 2,3% of which 81% correspond to company cars*.
  - Share of Hybrid (PHEV) is 8,9% in 2023 in Belgium
  - The EV share is slightly more than in other countries (1,5% in France, 3,1% in UK for EV+PHEV) but we are far behind other countries like China.
- Belgian insurers will witness a quick electrification of their **fleet portfolio** while their **retail portfolio** should undergo a slower transition from ICE to EV's.
- However, both portfolios (corporate and retail) are expected to be **mostly made up of electric vehicles** by year 2035-2040.



*Source: Stabel (https://statbel.fgov.be/fr/themes/mobilite/circulation/parc-de-vehicules#news)

FOCUS ON ELECTRIC VEHICLES

Why is the risk different for EV? (1/2)

- EVs and ICE vehicles are quite different in their conception. Many factors could lead to expect a difference in risk between them:
  - **Acceleration** : EV's have a greater acceleration than most ICE vehicles, which could lead to more claims.
  - **Autonomy** : EV's autonomy is less than ICE's autonomy which could lead EV's drivers to drive in a less sporty way to maximize this limited autonomy. This would lead to less claims.
  - **Noise** : EVs make much less noise than ICE vehicles, which could lead to more accidents (hence more claims on the motor third party liability) as people do not hear the vehicle coming.
  - **Usage:** It could also be expected that the usage of EVs will differ from the usage of ICE vehicles, as EVs will at first mostly be used in urban area (at least in their early adoption).
  - **EV's specific components**: The battery of an EV is the most expensive part of the vehicle, going for almost half of the price of it. Damaged battery would likely lead to a total loss of the car.
  - **Cost of labor**: More qualified people are needed to work on EVs, which will result in an increase of the cost.
  - **Weight**: Due to batteries EV's are heavier and hence it is likely they do not brake as effectively as ICE vehicle.
  - **Weight distribution** : Because the batteries are located below the vehicle the stability of EV's should be better.
  - **Charging hazard**: There is an additional risk of fire (compared to ICE) during the charging of the vehicle.

FOCUS ON ELECTRIC VEHICLES

Why is the risk different for EV? (2/2)

- Other points of attention regarding the EV are the following:
  - Their **depreciation** is different from thermic vehicle (likely faster, which tends to be prudent for total loss cover in real value)
  - They are more **exposed to catching fire** (during charging). For home insurances it is also key to assess the risk of having an EV charging in the garage
  - Some impact expected in the **assistance cover** (assistance if vehicle runs out of autonomy + assistance in case of fire) and some question about the coverage (or non-coverage) of damage to the vehicle during the charge.
  - The **inflation in repair costs** for EV could be different from thermic vehicles as it will be driven by the components of the battery.

FOCUS ON ELECTRIC VEHICLES

What to include in the pricing model?

- When comparing the explanatory variables of the thermic risk and EV risk we can identify the following groups :
  - Variables defined for both thermic and EV cars, with likely **same effect on the risk** (e.g : the driver related variables).
    - The effects of those variables calibrated on the thermic portfolio can likely be reused to price an EV car.
  - Variables defined for both thermic and EV cars but with **different effect on the risk** (e.g : power or insured value).
    - The effects of those variables calibrated on the thermic portfolio can not be reused as such to price an EV car.
  - Variables defined only for or **specific** to thermic or EV's

Explanatory Variables (non-exhaustive list)	No change expected	Adaptation needed	Not reusable	Comments
Variables related to the driver as a person (age, experience, …)	×			
Car brand	*×*		*×*	A brand which makes reliable ICE vehicles does not necessarily do the same for EVs
Power		×		EVs tend to be more powerful than ICE vehicles but it does not mean that it has the same risk
ADAS	×			
Insured value		×		Most of the value of an EV comes from the battery. The cost rate could not be calculated based on the insured value
Vehicle age			*×*	Components of EVs and ICE vehicles are different, they will then age differently
Number of km annually	×			
Vehicle usage	×			
Geographical zone		*×*		The usage of an EV could differ from the one of an ICE vehicle (shorter journeys, …)

* : The classification of these variables is still uncertain.

FOCUS ON ELECTRIC VEHICLES

What do we observe in other countries regarding pricing of EVs? (1/2)

- Some countries define **minimum share of new cars being electric** (e.g. 22% in the UK for 2024 with huge fines if not met) ➔ Increasing the already running evolution
- Tesla plan to capture the entire value chain by bringing their own insurance company (Tesla Insurance) ➔ business plan for other **EV manufacturers**
- *"Due to the nascent nature of the industry, EV incident claims are currently **25.5% more expensive** than their ICE equivalents and can take 14% longer to repair"**
  - *"Lack of affordable or available repair solutions and post-accident diagnostics"*
  - *"The cost of a replacement HV battery is causing a significant increase in the risk of 'total loss' or write-offs"*
  - *In UK, "Government guidelines state that due to fire risk, damaged BEVs awaiting repair should be stored in an outside quarantine area, at a safe distance of 15 meters from other nearby objects ➔ 98% reduction in repair capacity due to safe 48h quarantine adding a minimum of £60 to every claim"*
- Other sources mention a **repair costs 53% higher** for EV than for ICE**

*Source: https://www.fleetnews.co.uk/news/latest-fleet-news/electric-fleet-news/2023/07/05/electric-vehicle-repair-costs-revealed-versus-ice-equivalent

** Source: https://www.brusselstimes.com/463928/electric-cars-to-cause-increase-in-car-insurance-prices

FOCUS ON ELECTRIC VEHICLES

What do we observe in other countries regarding pricing of EVs? (2/2)

- **Repair costs are higher as well as the price of EV cars**
  - Currently insurance premium reflect this fact in a lot of countries
  - E.g. 5 to 10% higher premium in the US for the same make (EV vs ICE)
- Historically, it has been widely thought that insurance premiums for EVs are higher but analysis from insurance giants predicts that with the rapid rise in electric vehicles these **premiums will inevitably drop**
  - Commercial positioning around ESG/Sustainability issues could also drive the premium down
- This contradiction of the increasing risk seen with EVs, but the greater competition in the market (from 3rd party insurers as well as the manufacturers such as Tesla providing in-house insurance) will prove a **difficult** balancing act for insurers **to manage their pricing positions**
  - Potential decorrelation between risk and premium **impacting the profitability**?

FOCUS ON ELECTRIC VEHICLES

Pricing strategy

Likely evolution of the insurer's situation regarding technical pricing capabilities

Insurer with (almost) no data

- Use ICE vehicles portfolio to price EVs
- Only data that are relevant for EV could be used (e.g. power not relevant)
- Practical steps
  - Adjust the set of variables used
  - Rerun the ICE vehicle model on this set of variables
  - Adjust the global risk level (e.g. with figures coming from (foreign) market
- Limitation: it assumes that the impact of an EV compared to an ICE vehicle is only global and that the reworked variables are relevant for measuring EV risks.

Insurer with a bit of data

- Use his entire portfolio to price EVs
- Separate the variables that could not be used for both vehicle types at the same time ➔ not used in the pricing model 1
- If there are new variables that are only related to EVs, a second model could be performed with only these new variables to have even more precise results (correction of the pricing model 1).

Insurer with a lot of data

- The insurer could base his calculation only on EVs data.
- He will still have to pay attention to use only explanatory variables that are related to EVs, and to add new variables that only concerns EVs

What about ESG role of the insurer?
Propose a lower commercial premium than the equivalent premium for an ICE vehicle?
Which impact on profitability?

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CONCLUSION

Pricing Fairness challenge for insurance companies

Customer segmentation

- A fair premium, related to his/her risk profile, to minimize the potential for adverse selection.
- *i.e. the good risks could lapse and accept a lower premium elsewhere, leaving the insurer with an inadequately priced portfolio.*

Risk pooling

- The use of machine learning and external data for pricing should not lead to an extreme personalization of risk/premium
- *E.g. extremely high premiums for some risk profiles that actually imply no risk transfer.*
- The insurer has the social role of creating solidarity among the policyholders.

Keeping pricing fairness :

Big data and ML models could lead to an increased segmentation among policyholders which has to be managed as well (to avoid un-insurability of some risks)

CONTACT DETAILS

Thank you !

Do you have questions ?

Reacfin
Know-How to Risk

Reaxii Reacfin Consulting Reacfin Academy

About us

We develop, in partnership with our clients, actuarial & quantitative financial solutions, building on strong data analytics, while securing full transparency and integral knowledge transfer.

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