Measuring Claims Inflation: an Argentinean Case Study

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Motor Liability in Argentina

- Homogeneous portfolio ≠ homogeneous claims

- Claims type segmentation
  - Material damage (RCC)
  - Bodily injury (RCL)
  - Death (RCHO)

- Claims legal segmentation
  - Administrative (ADM)
  - Mediation (MED)
  - Trial (TRI)
Claims Durations

- Long tail business

- Little IBNYR
Claims Timing

- Payout mostly at settlement
  - Lump sum + expenses
  - No medical treatments
  - No annuities
Claims Timing

The diagram shows the exceedance probability over time for different years, with each year represented by a different color. The pie chart in the inset illustrates the distribution of claims timing across different months for the year 2013.
Claims Timing

- Payout mostly at settlement
  - Lump sum + expenses
  - No medical treatments
  - No annuities

- Define a claims „mortality“ table:

  \[ q_x \rightarrow \Gamma_{s|n} = \text{probability to settle in year } s \]
  \[ \text{if still open in year } n \leq s \]

- 0-6 months
- LAE
- Indemnity + LAE

claim payout

time
Claims Reserves

- Statutory reserves
  - Strict prescribed mechanic procedure
    ⇒ Useless

- ALAE
  - Individually volatile
  - Stable on average
- Nearly independent from indemnity
  ⇒ Useless
Claims Predictor: Disability Points

- Only for bodily injury (physical + psychological)
- Volatile
- Average nearly proportional to indemnity
- Awarded points increase with claim's duration
  - Forensic physicians fees proportionate to indemnity!
Claims Inflation

- Which inflation?
  - Government statistics
    - Falsified
  - Commercial statistics
    - Numerous
    - Inconsistent
Claims Interests

- Granted by courts
  - Passive = if plaintiff wealthy
  - Active = if plaintiff must borrow

- In-between interests exist

- Accounted for in settlements
  - But inconsistently

- Not compounded!
Claims Procrastination

- Complex claims take longer

- Procrastination increases indemnity
  - Lawyers fees
  - Forensic physicians
  - Award of psychological disability points
  - ...

- Adds up *de facto* to the effect of claims interests:

  The longer it takes a claim to settle,  
  the higher the indemnity
Claims Normalization

- **Hypothesis:**
  - Interest & procrastination independent of settlement year
  - Inflation independent of duration

⇒ Normalize indemnities to compare claims:

\[ X \rightarrow \tilde{X} = \Lambda_n^s \Pi_{\alpha}^s X \]

- Same inflation
- Same interests & procrastination
Indemnities survival probabilities
- Different scales according to accident year
- Similar lognormal shape

Inflation
Normalize indemnities
- To current calendar year
- Kolmogorov-Smirnov fit
Inflation

Development year

Settlement year

Inflation vector
Inflation

same constant inflation vectors
Inflation

- 2 different claims inflations
  - RCC material damage & death
  - RCL bodily injury

- Claims normalization
  
  - RCC
  
  - RCL

\[
X \rightarrow \tilde{X} = \Lambda^n
\]

\[
\Lambda^n = (1 + 20\%)^{n-s}
\]

\[
\Lambda^n = (1 + 10\%)^{n-s}
\]
Interests & Procrastination

Normalize indemnities
- To settlement year 0
- Kolmogorov-Smirnov fit

Indemnities survival probabilities
- Different scales according to settlement year
- Similar lognormal shape
Interests & Procrastination

- Claims normalization

  - $\Pi_n^s = (1 + 20\%)^{a-s}$

  $$X \rightarrow \tilde{X} = \Lambda_n \Pi_a^s X$$
Large Claims

- Whatever AY, SY, DY
  - Good fit to lognormal
  - No need to separate attritional & large claims

![Graph showing indemnity amount distribution with various curves labeled 0 to 7 and lognormal]

Legend:
- Blue: 0
- Red: 1
- Yellow: 2
- Green: 3
- Orange: 4
- Purple: 5
- Light blue: 6
- Green: 7
- Black: Lognormal
Reserves

as-is → as-if

past interests + procrastination → past inflation

accident notification closure now

current → ultimate

past & future interests + procrastination → future inflation

accident notification now closure
## Models

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<th>Runoff</th>
<th>Exposure</th>
<th>Decay</th>
<th>Disability</th>
<th>LD</th>
<th>BF</th>
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### Models

| Runoff | Exposure | Decay | Disability | LD | BF | ...
|--------|----------|-------|------------|----|----|---|
## Models & Assumptions

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Model: Runoff

- Runoff
  \[ R^a = (CR^a + IBNYR^a) \sum_{s \geq n} \Lambda^n_s \Pi^n_s \Gamma_{s-a|n-a} \]

- Exposure
  \[ R^a = (1 + ALAE)(E^a X^a - P^a) \sum_{s \geq n} \Lambda^n_s \Pi^a_s \Gamma_{s-a|n-a} \]

- ...
Reserves

**as-is → as-if**

- Past interests + procrastination
- Past inflation

- Accident notification
- Closure
- Now

**current → ultimate**

- Past & future interests + procrastination
- Future inflation

- Accident notification
- Now
- Closure
Reserves

- Current → Ultimate
- Past & Future Interests + Procrastination
- Future Inflation

- Accident Notification
- Now
- Closure

- Time

- Best Estimate
- Future 1
- Future 2

- Graph showing reserve levels from 2013 to 2021 with estimated values from 0 to 7,000,000.
Forecast the Future
Conclusions

- Argentina is complex
- ESG are important
- AvE are important
- Actuarial techniques are not science, they are engineering
Reserving

Different models depending on
- data availability / quality
- line of business / market
- processes / products
- …
- actuarial judgment

→ 1st moment of a distribution

.standard reserving model

Solvency II

Different models depending on
- data availability / quality
- line of business / market
- processes / products
- …
- actuarial judgment

→ nth moment of a distribution

.standard solvency formula

... et Carthago delenda est!
Internal models

- Numerical aggregation of realistic distributions
  \[ SCR \leftarrow \text{risk}_1 \otimes \text{risk}_2 \otimes \text{risk}_3 \otimes \cdots \]
- Probe the true tail

Standard Solvency II formula

- Analytic linear approximation
  \[ SCR \leftarrow \sigma^2 = \sum \rho_{ij} \sigma_i \sigma_j \]
- Probe the tail with 2\textsuperscript{nd} moments

... et Carthago delenda est!
Internal model

- Numerical aggregation of realistic distributions
  \[ SCR \leftarrow \text{risk}_1 \otimes \text{risk}_2 \otimes \text{risk}_3 \otimes \ldots \]
- Probe the true tail

... et Carthago delenda est!
Lecturer’s Coordinates

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