

# **SWEDISH MOTOR INSURANCE - TERRITORIAL PERFORMANCE REVIEW**

***(SAS Studio × Tableau Workflow)***

***Bryce Smith***

## **TABLE OF CONTENTS**

- 1 Cover & Executive Summary**
- 2 Business Context & Objectives**
- 3 Data Overview**
- 4 Methodology**
- 5 Findings & Visual Evidence**
  - Exhibit 1 – Avg Cost per Policy by Zone
  - Exhibit 2 – Frequency × Severity Bubble Plot
  - Exhibit 3 – Premium Multiplier Bar
  - Exhibit 4 – Cumulative Loss Pareto
- 6 Recommendations & Impact**
- 7 Limitations & Assumptions**
- 8 Appendix**
  - A Data Acquisition & Cleaning
  - B SAS Highlights
  - C Full Code & Notebooks
  - D Glossary & KPI Definitions

## 1. Cover & Executive Summary

---

**Title** Swedish Motor Insurance - Territorial Performance Review

**One-line Tagline** Rapid zone-level cost diagnosis & actuarially fair premium relativities

**Problem Statement** Management requested a rapid assessment of territorial (zone) performance to:

- Rank zones by cost per policy
- Identify where claims are most frequent
- Pinpoint zones with both high frequency and high severity
- Derive actuarially fair premium multipliers (relativities)
- Package the evidence in clear Tableau visuals for decision-makers

**Key Metric Lift / \$ Impact** +4 - 5 pts improvement in combined ratio at portfolio-neutral average rate change

### Headline Insights

- Two zones (1 & 2) generate 65 % of incurred loss and cost ~40 % above average.
- Premium surcharges of +10 - 40 % (credits -25 - 35 %) realign price to risk and lift combined ratio 4 - 5 pts.
- Four Tableau exhibits walk executives from diagnosis to prescription in <5 minutes.

## 2. Business Context & Objectives

---

**Brief Company Description** Swedish Motor Insurance is a nationwide personal-auto insurer writing compulsory third-party liability policies across seven territorial zones. The book comprises ~2 200 accident-year exposures captured in the latest underwriting extract.

**Why This Question Matters** Territorial relativities are the single largest driver of premium adequacy in Swedish motor lines. Mis-priced zones erode margin, create cross-subsidies, and expose the company to regulatory scrutiny over fairness.

## SMART Objectives

- File revised territorial relativities by Q3 2025 for Q1 2026 effective dates.
- Reduce portfolio combined ratio  $\geq 4$  pts within 12 months of implementation.
- Sustain  $\geq 5$  % policy growth in profitable Zones 6-7 over the same period.

## 3.Data Overview (high-level)

---

Item	Include Here
Source name & public link	SwedishMotorInsurance.csv (Kaggle public dataset)
Time span & row/col counts	Latest accident year; 2 182 records $\times$ 7 numeric variables
Key joins / grain	One record = Zone $\times$ Kilometres $\times$ Bonus risk cell; no joins

*(Detailed SAS import code, API keys, and raw screenshots are provided in Appendix A.)*

## 4.Methodology

---

**Analysis Pipeline (3-5 bullets)** • *ETL in SAS Studio* - **PROC IMPORT** with **guessingrows=max**; schema validation via **PROC CONTENTS**. • *Data Hygiene* - orphan checks, negative/zero exposure scan, defensive numeric coercion. • *KPI Construction* - frequency, severity, pure premium, and relativities computed in SAS (see GitHub). • *Export to Tableau* - aggregated KPI CSV pushed to Tableau for interactive visualisation.

**Modeling Techniques** Pure-premium relativities based on exposure-weighted frequency  $\times$  severity decomposition; no GLM required at this granularity.

*(Code notebooks and SQL files are linked in GitHub - see Appendix C.)*

## 5. Findings & Visual Evidence

---

**Q1. Which territories cost us the most per policy?** *Chart 1 - Avg Cost per Policy by Zone*  
Zones 1-2 cost ~40 % above the portfolio mean; Zones 4-7 are materially cheaper.

**Q2. Where do frequency and severity combine to hurt?** *Chart 2 - Frequency × Severity Bubble Plot*

Zones 1-2 sit top-right (high-freq, high-sev); Zones 6-7 bottom-left (low-low). Bubble size confirms Zone 1's large exposure.

**Q3. What premium multipliers restore adequacy?** *Chart 3 - Premium Multiplier Bar (ref = 1.00)*

Recommended relativities: Zone 1 = 1.39, Zone 2 = 1.10, Zone 3 = 0.85, Zone 4 = 0.75, Zone 6 = 0.65, Zone 7 = 0.65.

**Q4. How concentrated is the loss?** *Chart 4 - Cumulative Loss Pareto*

Three zones (4 → 1 → 2) account for ~80 % of total incurred loss.

*(Exhibits 1-4 appear in the attached Tableau workbook.)*

## 6. Recommendations & Impact

---

**Prioritised Actions (verb + metric + owner)** 1. *Apply* +39 % surcharge in Zone 1; +10 % in Zone 2 (Pricing, Q3 filing). 2. *Offer* credits of -25 % to -35 % in Zones 4, 6 & 7 to stimulate growth (Pricing & Marketing, Q3). 3. *Audit* high-severity claims in Zone 2 to isolate cost drivers (Claims, Q4). 4. *Launch* growth campaign focused on Zones 6-7 (Distribution, Q4 launch). 5. *Deploy* live monitoring dashboard mirroring Exhibits 1-4 (Data Ops, Q3-Q4).

**Expected Lift / Savings & Caveats** Combined ratio improves 4 - 5 pts while average portfolio rate change remains neutral; relies on stable loss trends and regulatory approval.

**Next-Steps Roadmap** Rate-filing package → Regulatory submission (Q3) → Dashboard go-live (Q4) → 6-month post-implementation review (Q2 2026).

## 7. Limitations & Assumptions

---

- Single accident-year dataset may amplify random volatility; multi-year validation recommended.

- Two payment-zero rows retained; assume correct coding of frequency severity logic.
- No external socio-economic or weather covariates included—potential omitted-variable bias.
- Relativities assume static behaviour; exposure shifts post-pricing not modelled.
- Tableau charts rely on manual zone mapping; future ETL changes may break links.

## 8. Appendix

---

### A. Data Acquisition & Cleaning

- Full SAS import script with QC comments.
- Schema diagram of 7-field dataset.

### B. SAS Highlights

- Array loop for defensive numeric coercion.
- Frequency × Severity macro.

### C. Full Code & Notebooks

- GitHub repo: <link-placeholder> (import, KPI, Tableau extract).

### D. Glossary & KPI Definitions

- *Exposure* - number of insured policy-years.
- *Frequency* - claims per exposure.
- *Severity* - average paid per claim.
- *Pure Premium* - Frequency × Severity.

SAS Code in [Github](#)

[https://github.com/thebryce15/swedish\\_motor\\_insurance/blob/main/scripts/swedish\\_insurance.sas](https://github.com/thebryce15/swedish_motor_insurance/blob/main/scripts/swedish_insurance.sas)

.Full Github [Repository](#)

[https://github.com/thebryce15/swedish\\_motor\\_insurance](https://github.com/thebryce15/swedish_motor_insurance)