Pet Insurance Simulation: Profitability & Owner Value

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Economics Graduate | Data & Insurance Modeling | R, Excel, SQL

https://github.com/ColemanOrlick/Pet-Insurance-Project.git

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Project Overview: Modeling Pet Insurance with Real Data

Project Goal

- Based on real 2023 U.S. industry data (NAPHIA, ASPCA, Pawlicy Advisor)
- Simulated 10,000 insured dogs using R
- Compared insurance profits vs. what owners actually paid

Why?

- Combines my interest in economics, real world modeling, and risk
- I wanted to explore how insurance works in practice

The inspiration behind the project

How the Simulation Worked

Claim Frequency
Poisson Distribution

- Simulated how many claims each dog had per year
- Real World Average: ~0.7 claims/year
- rpois (n, λ = 0.7)

Claim Cost
Lognormal Distribution

- Simulated the cost of each vet visit or surgery
- Matched real 2023 vet cost data (avg claim: $400-$450)
- Used lognormal to reflect rare, high-cost events

Policy Features
Realistic Insurance Terms

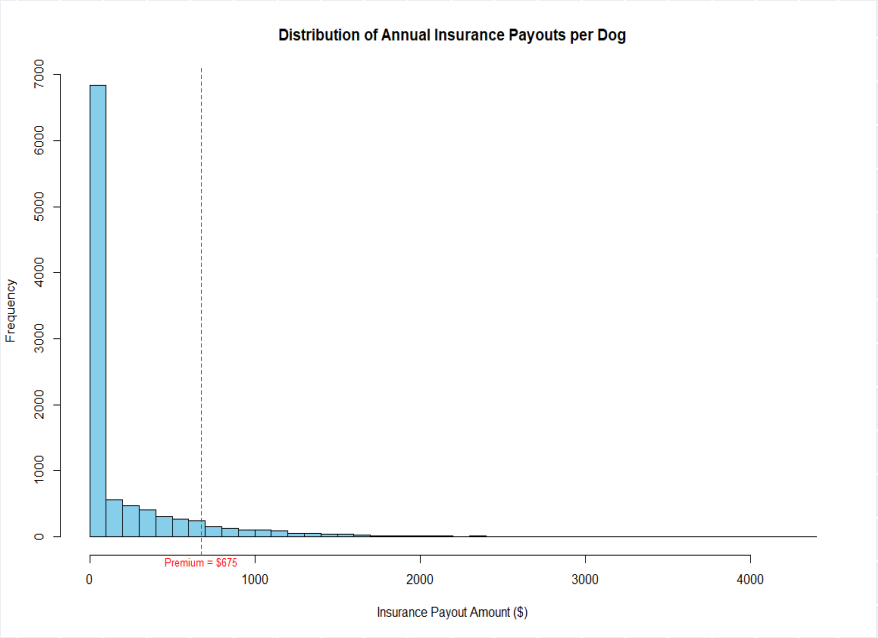
- $250 deductible
- $5,000 annual policy limit
- Compared actual payouts to owner premiums ($675/year)

Simulation was run on 10,000 insured dogs using R; costs and parameters based on 2023 data from NAPHIA, ASPCA, Pawlicy Advisor.

Insurer Results: Profitability Analysis

- ➔ Avg annual premium collected: **$675**
- ➔ Avg payout per dog: **$188**
- ➔ Underwriting margin (before expenses): **72%**

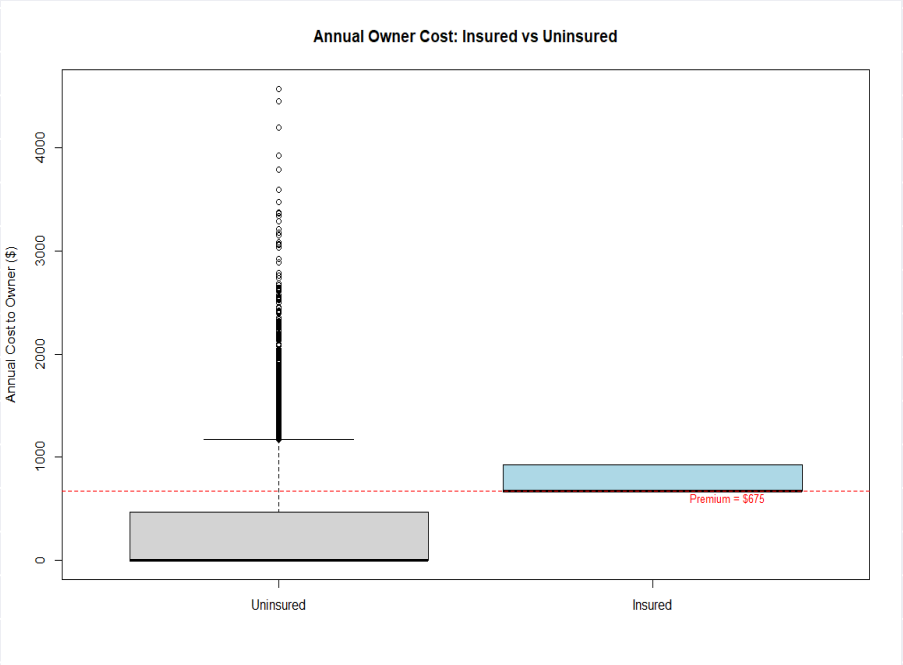
Pet Insurance appears **highly profitable** for insurers under realistic assumtions, most premiums are collected without large claims paid out.



Owner Results: Did Insurance Pay Off?

- ➔ Avg cost (insured): **$790**
- ➔ Avg cost (uninsured): **$303**
- ➔ % of owners who saved money with insurance: **9.4%**

Insurance **adds cost for most owners**, but can prevent financial shocks in rare, high-claim years.



Key Takeaways

Pet insurance is profitable for insurers

Most dogs have low or no claims, resulting in a ~72% underwriting margin before expenses.

Most owners pay more than they get back

Only 9.4% of owners received more in payout than their $675 premium.

Insurance provides protection, not savings

It reduces risk exposure to rare, high-cost events, not average expenses.

This project helped me apply statistical modeling in R, analyze real-world economic behavior, and communicate technical results clearly, all skills I'm excited to bring into a data or actuarial role.