2022 Liberty Mutual Case Competition

Team 14:
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Agenda

1	**Reserving Objective**
2	**Reserving Methods**
3	**Ultimate Loss Selections**
4	**Standardization**
5	**CAT Reserving**

1 Reserving Objective

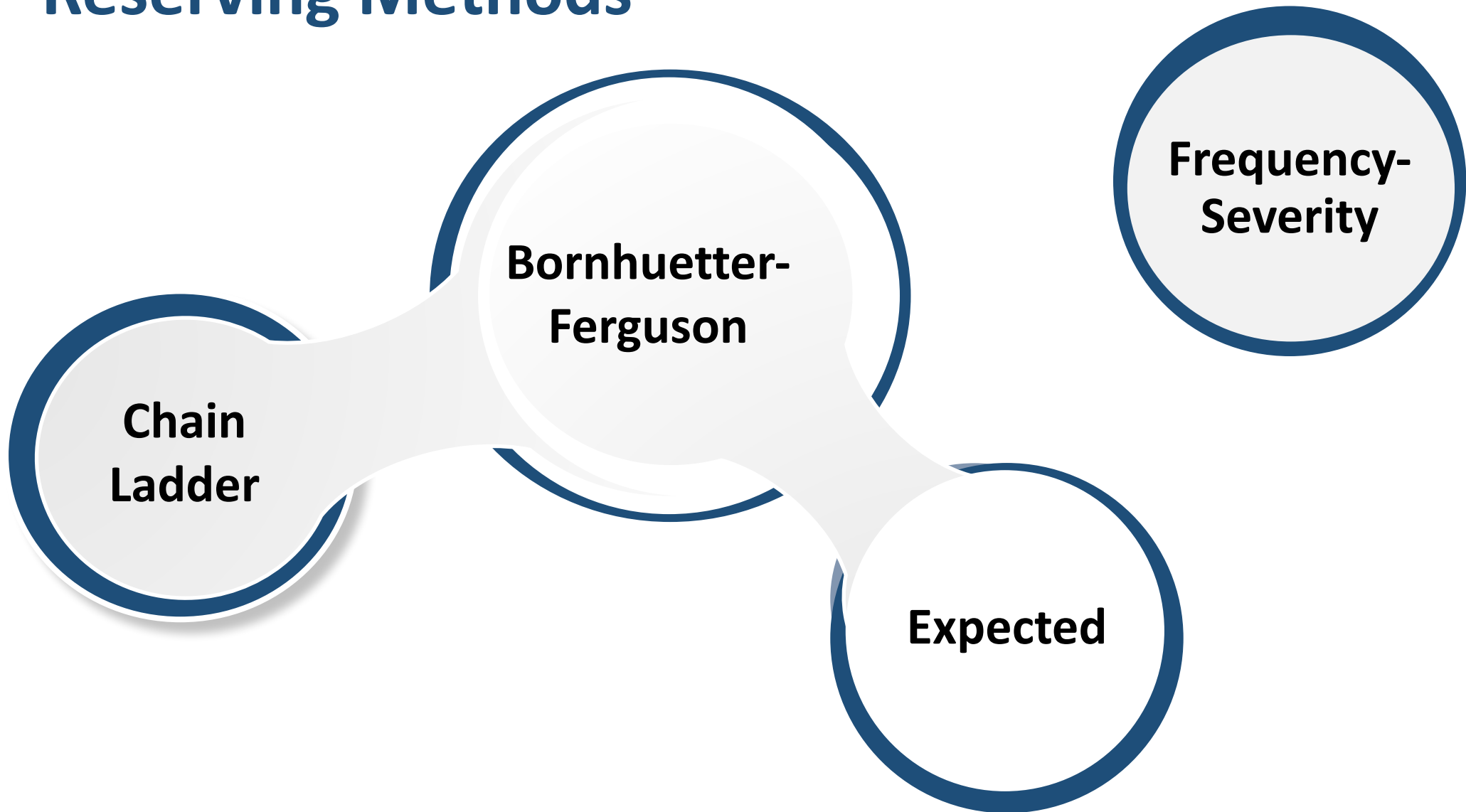# Why is reserving necessary?

Legitimacy

Business Decisions

Laws

2 Reserving Methods

Reserving Methods

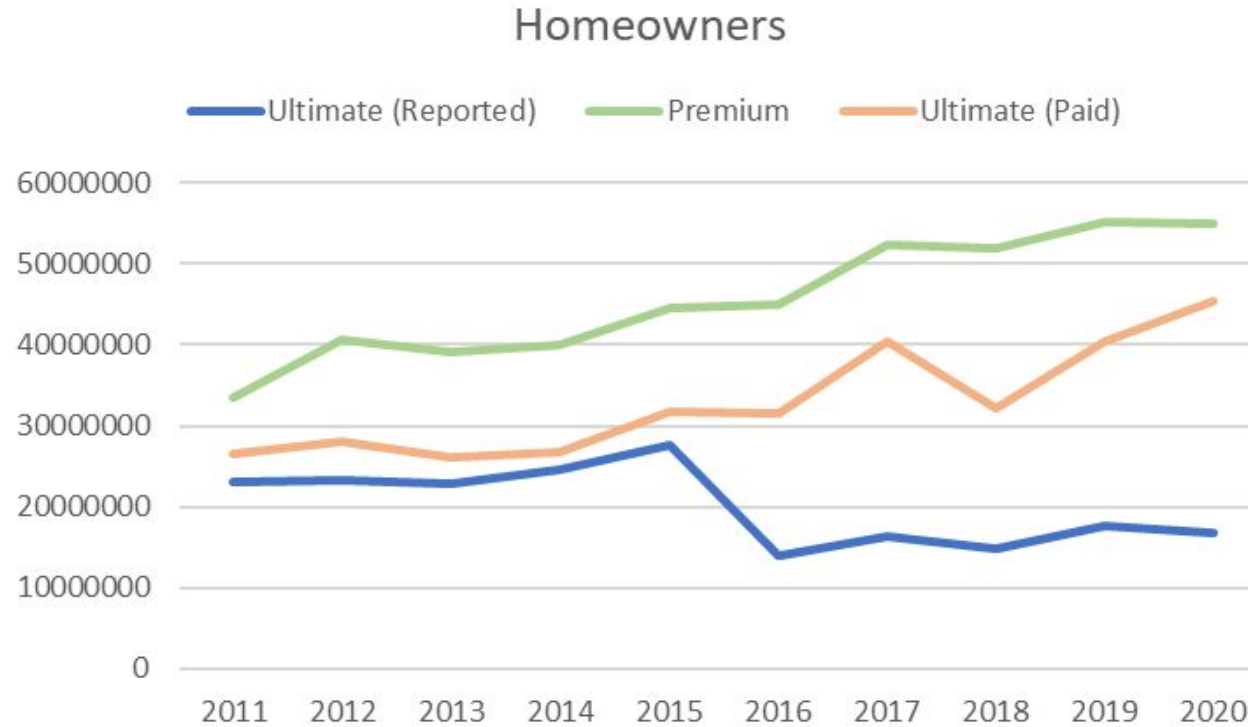Chain Ladder

Bornhuetter-Ferguson

Expected

Frequency-Severity

Chain Ladder Method

Total Ultimate Loss

Reported:
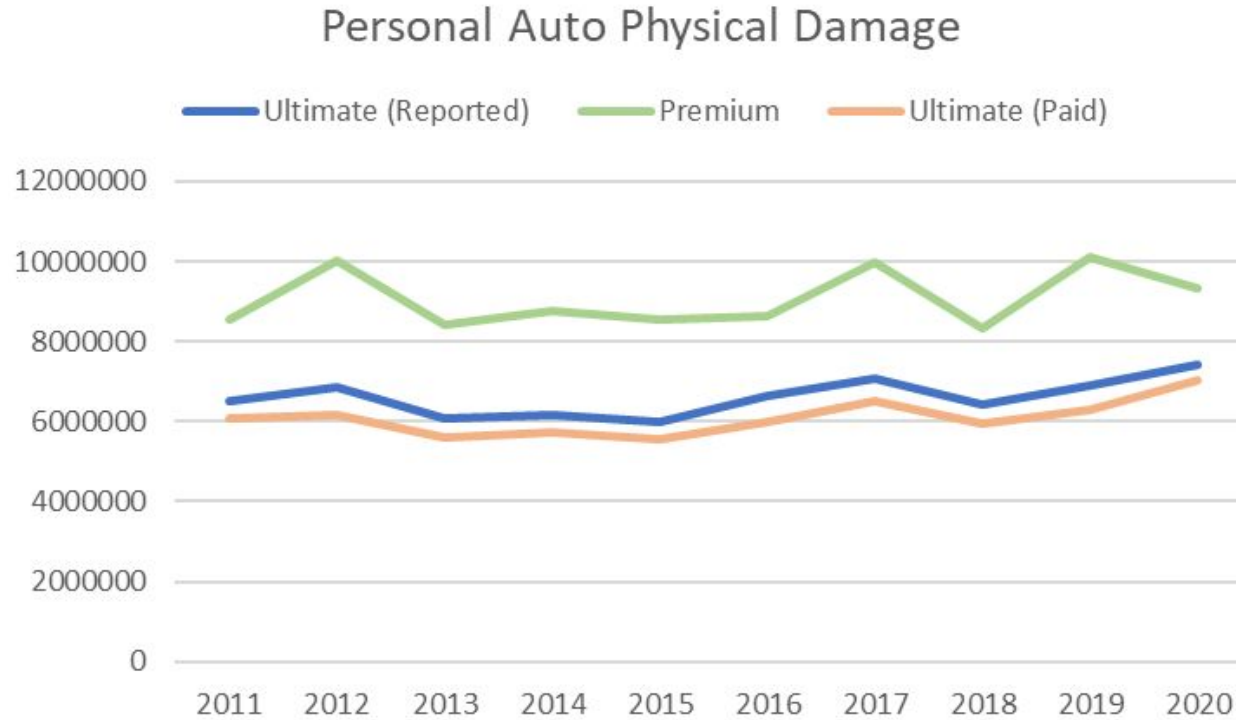200,740,175

Paid:
329,257,430

Homeowners

Total Incurred Loss:
346,224,812

1 **Chain Ladder Method**

Total Ultimate Loss

Reported:
66,011,648

Paid:
60,912,199

Personal Auto Physical Damage

Legend: Ultimate (Reported), Premium, Ultimate (Paid)

Total Incurred Loss:
97,615,551
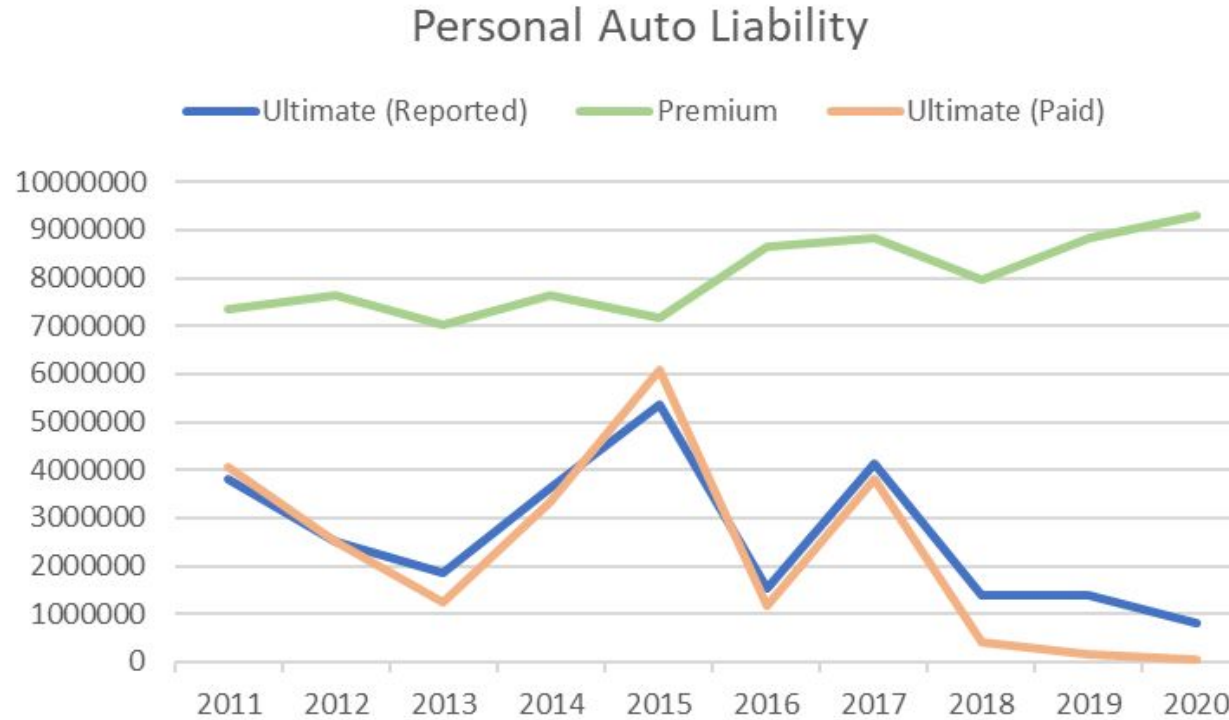
Chain Ladder Method

Total Ultimate Loss

Reported:
26,367,701

Paid:
22,855,274

Total Incurred Loss:
32,471,048

Personal Auto Liability

Chain Ladder Method

Pros

Straightforward

⬇

Uses historical Loss development patterns

Cons

Random fluctuations in data

⬇

Prone to errors

2 **Expected Loss Ratio Method**

Homeowners Property

— Ultimate Loss — Premium
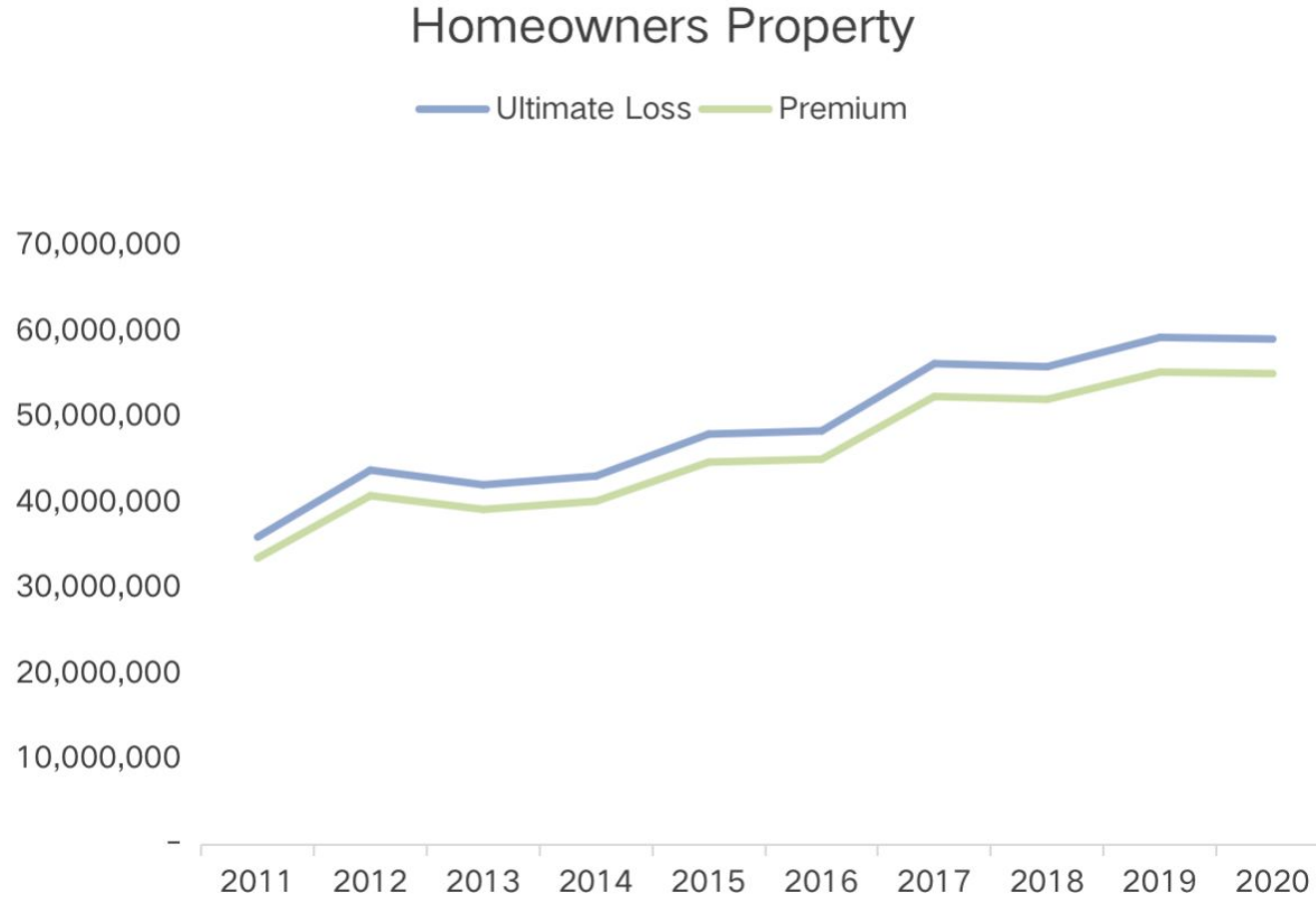
Expected Loss Ratio:
1.07

Total Ultimate Loss:
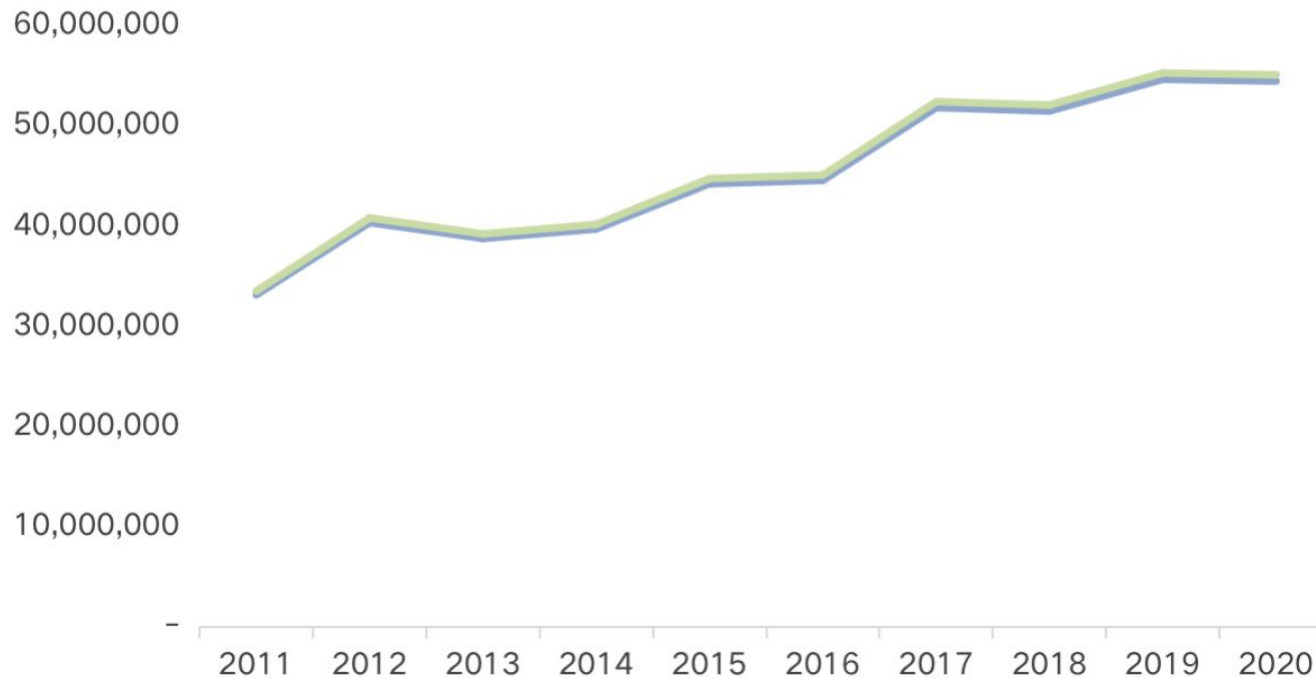490,937,605

Total Incurred Loss:
346,224,812

Emerging Liability:
144,712,793

Expected Loss Ratio Method

Alternative Homeowners Property

— Ultimate Loss — Premium

Expected Loss Ratio:
0.99

Total Ultimate Loss:
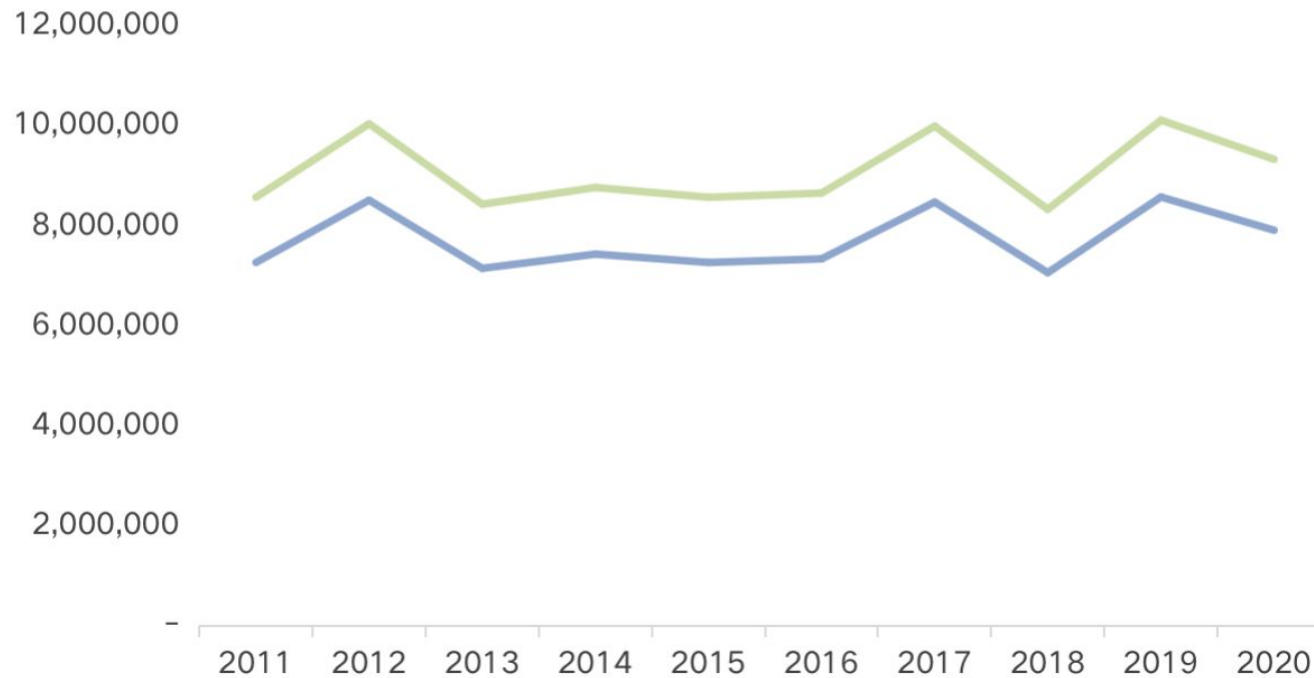452,193,528

Total Incurred Loss:
346,224,812

Emerging Liability:
105,968,716

Expected Loss Ratio Method

Personal Auto Physical Damage

Expected Loss Ratio:
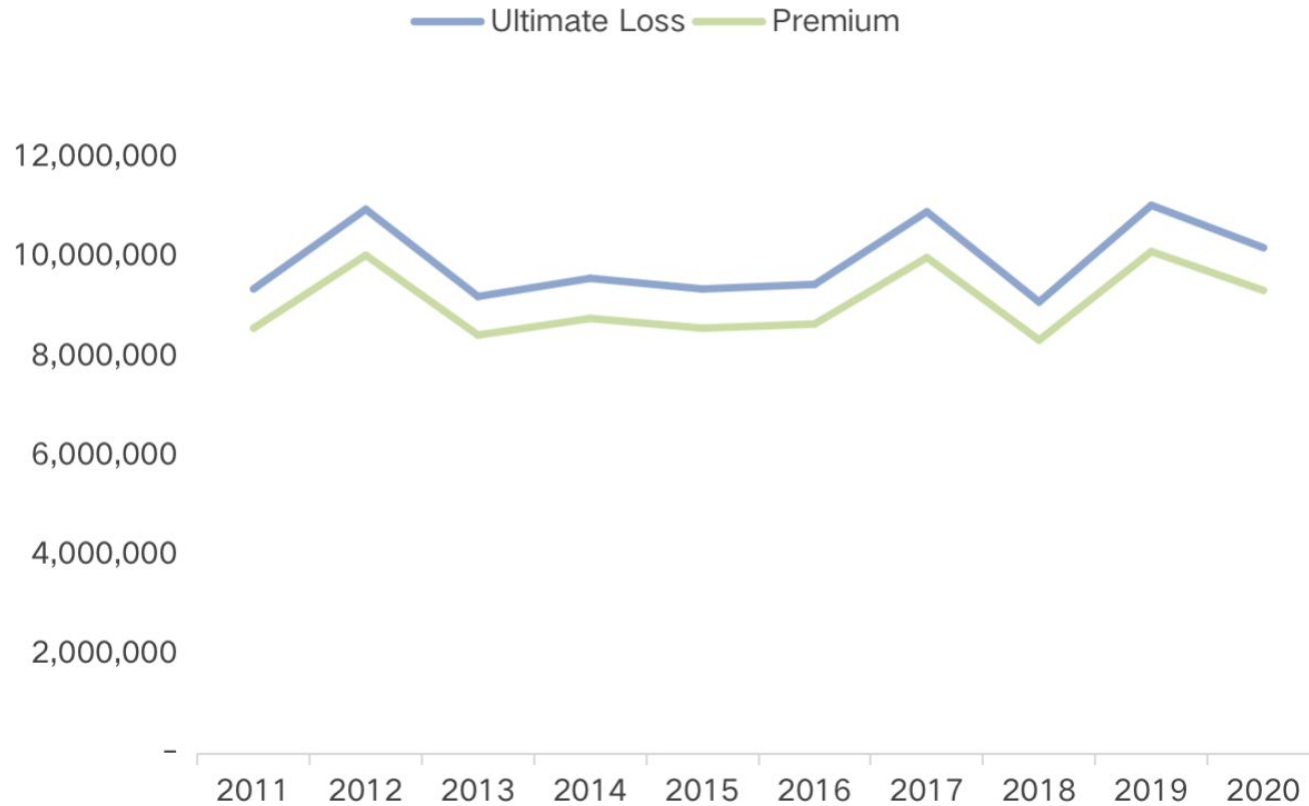0.85

Total Ultimate Loss:
76,827,129

Total Incurred Loss:
97,615,552

Emerging Liability:
(20,788,422)

Expected Loss Ratio Method

2

Alternative Personal Auto Physical Damage

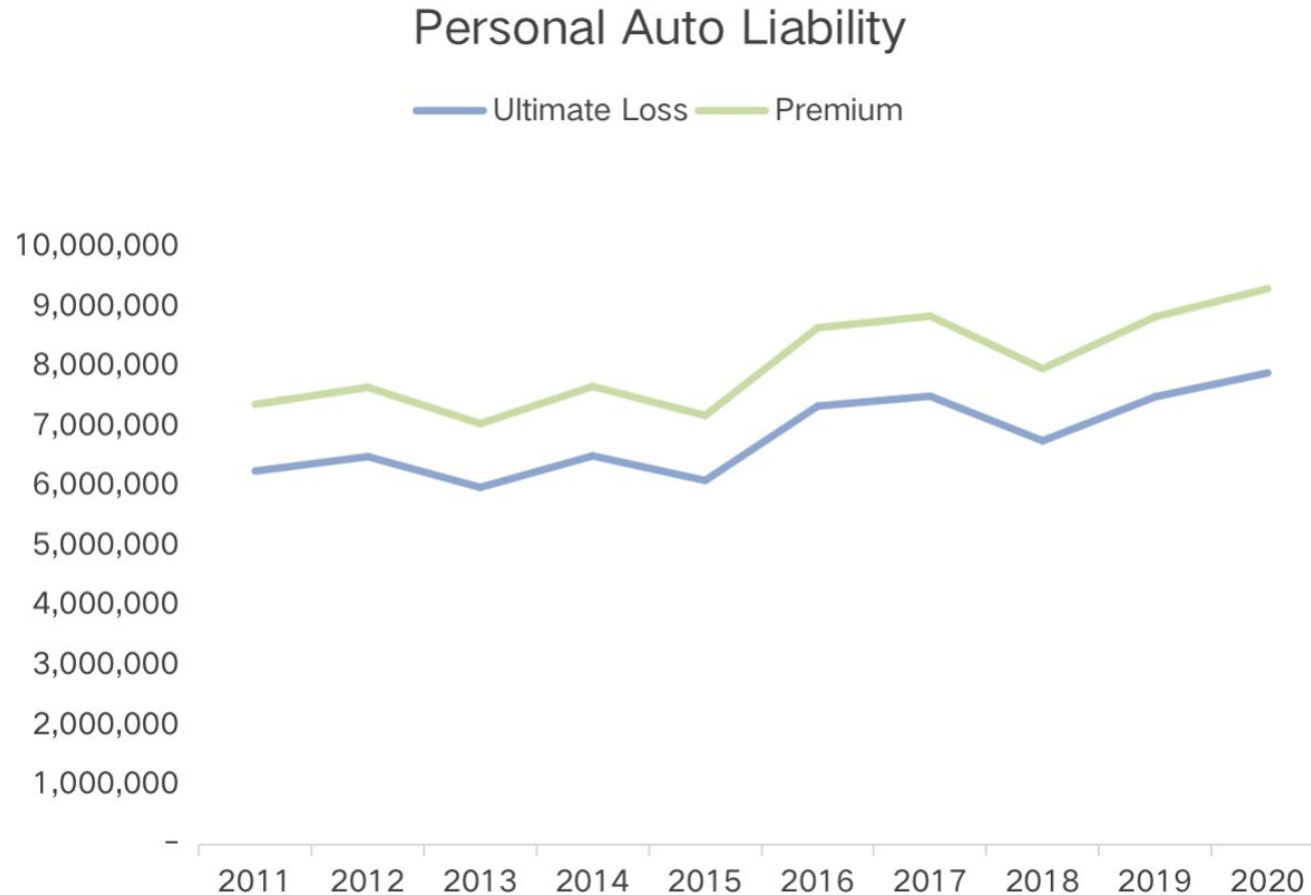— Ultimate Loss — Premium

Expected Loss Ratio:
1.09

Total Ultimate Loss:
98,970,936

Total Incurred Loss:
97,615,552

Emerging Liability:
1,355,384

2 **Expected Loss Ratio Method**

Personal Auto Liability

— Ultimate Loss — Premium

Expected Loss Ratio:
0.85

Total Ultimate Loss:
68,179,057

Total Incurred Loss:
32,471,048

Emerging Liability:
35,708,008

Expected Loss Ratio Method

Pros

Works with

⬇

Lack of past claims
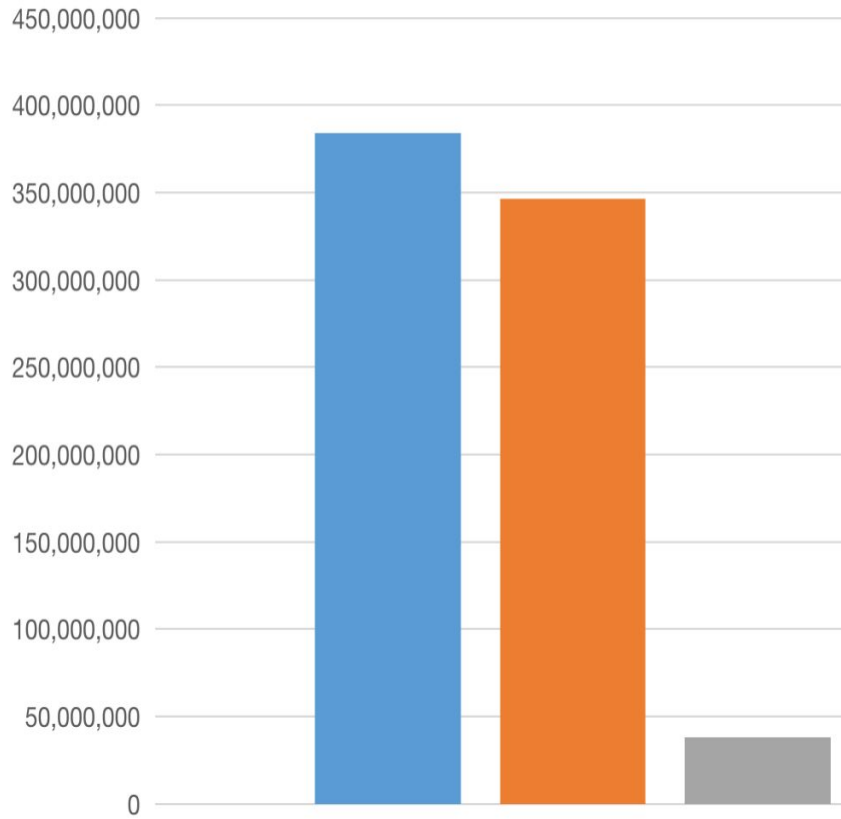and
small sample size

Cons

Lack of sensivity
in data

⬇

Less accuracy
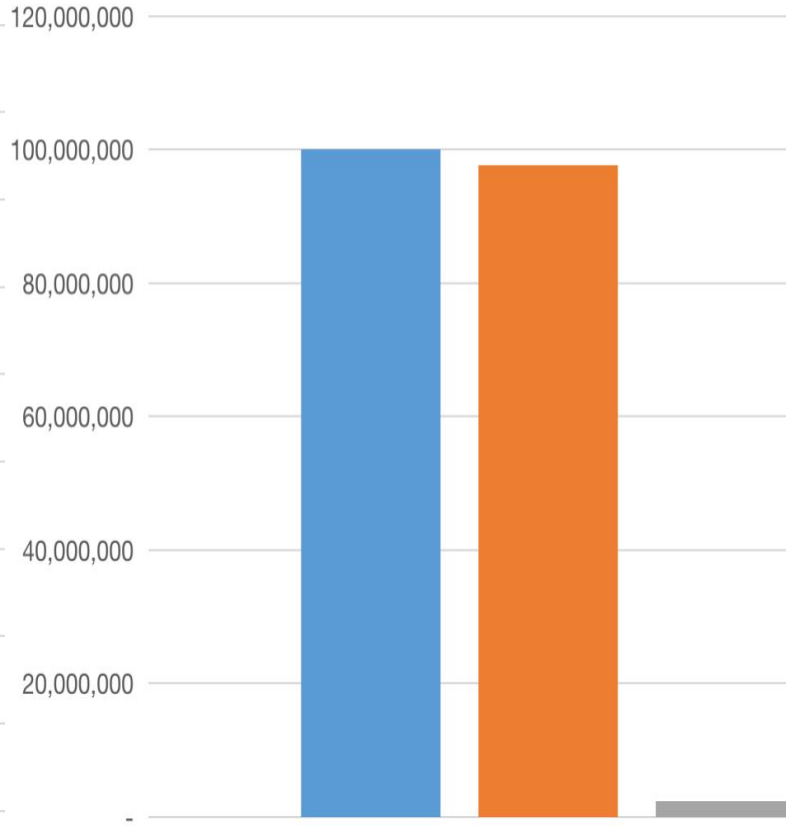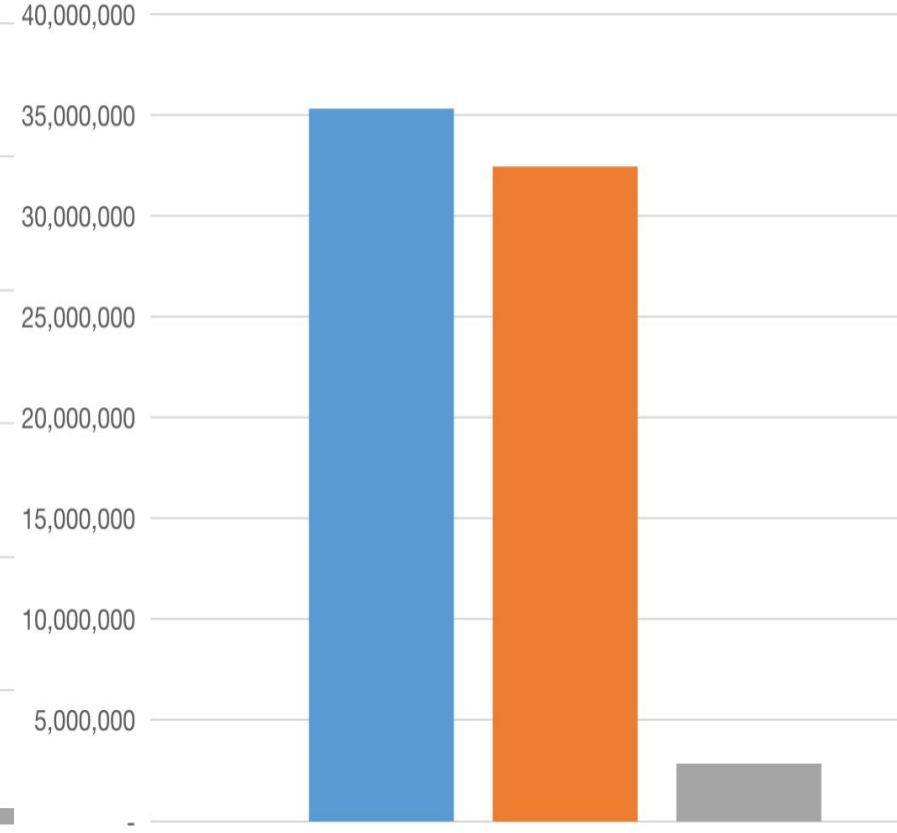
3 Bornhuetter-Ferguson Method

Homeowners Property

Personal Auto Physical Damage

Personal Auto Liability

■ Total Ultimate Loss ■ Total Incurred Loss ■ Emerging Liability

3 Bornhuetter-Ferguson Method

Pros

More responsiveness to data

$\downarrow$

Better stability

Cons

Requires accurate development pattern

$\downarrow$
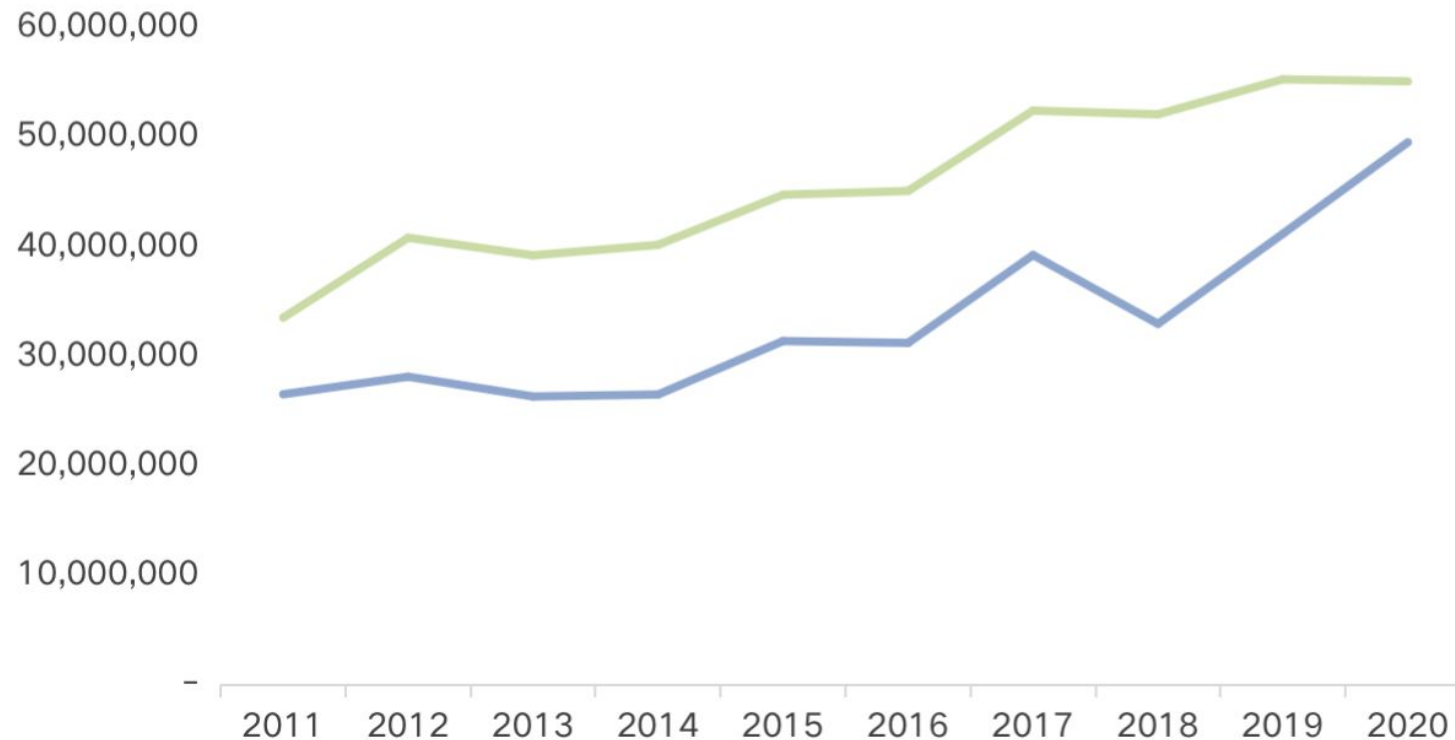
Ineffective balance with inaccuracy in patterns

Frequency-Severity Method
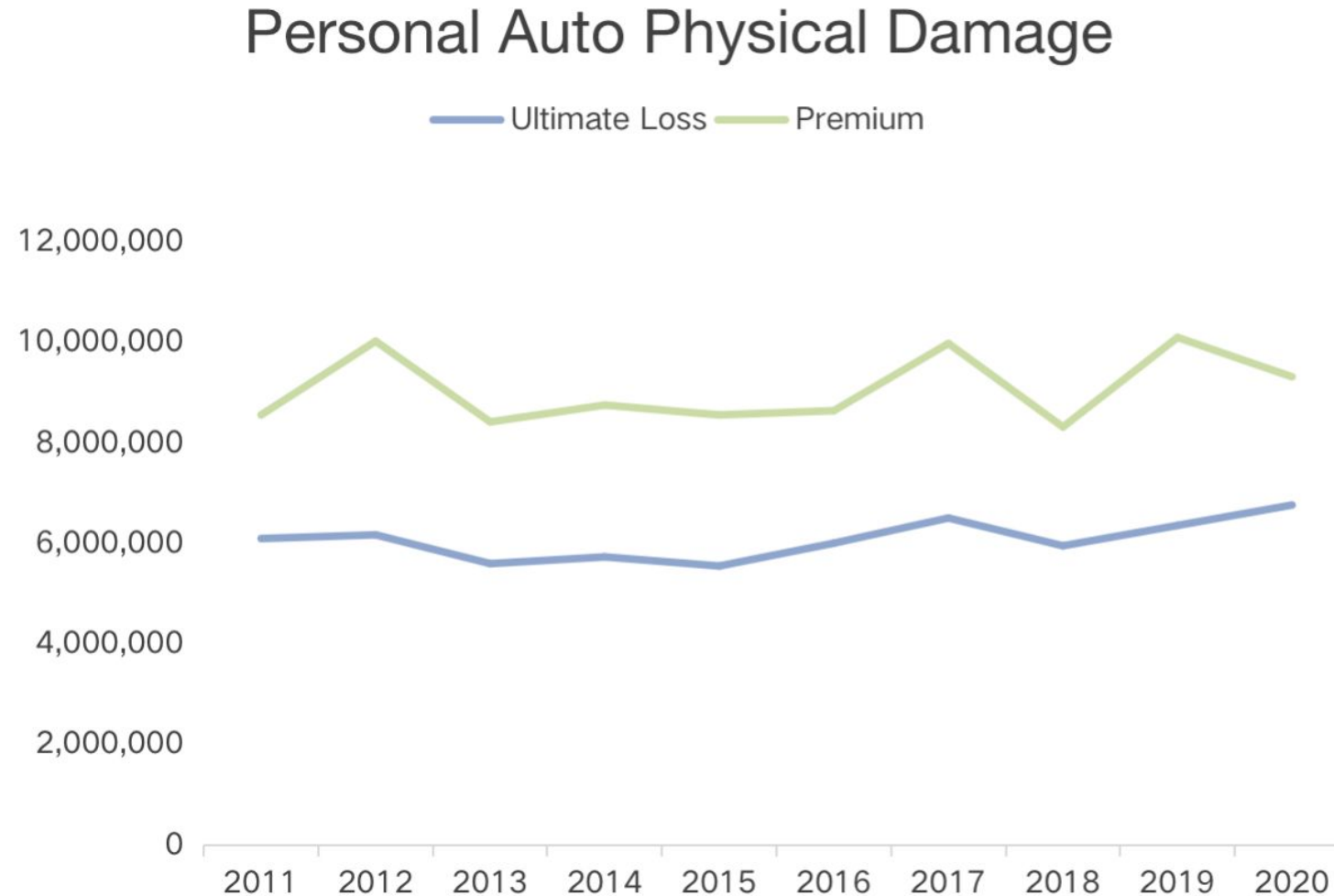
Homeowners Property

— Ultimate Loss — Premium

Total Ultimate Loss:
300,175,793

Total Incurred Loss:
346,224,812

Emerging Liability:
(46,049,019)

Frequency-Severity Method

Personal Auto Physical Damage

—— Ultimate Loss —— Premium

Total Ultimate Loss:
58,322,797

Total Incurred Loss:
97,615,551
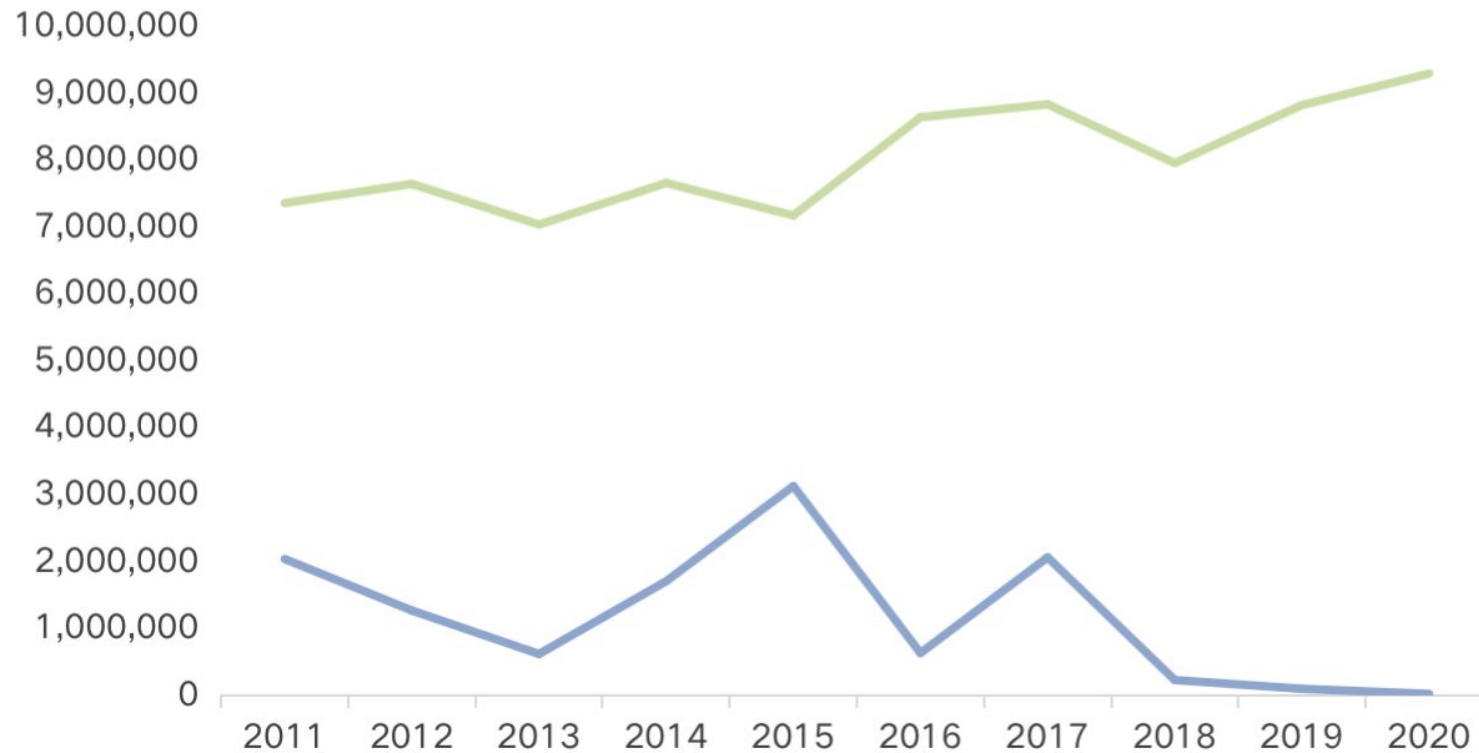
Emerging Liability:
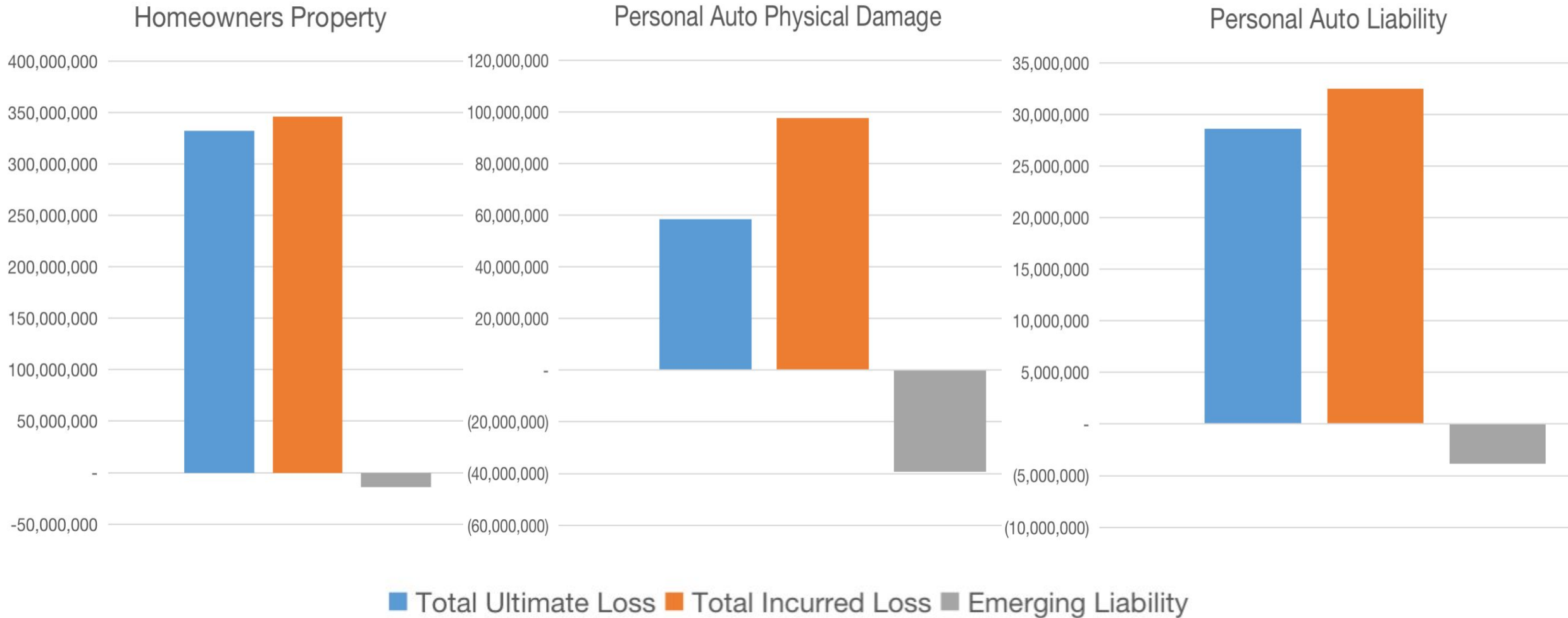(39,292,755)

Frequency-Severity Method

Personal Auto Liability

Total Ultimate Loss:
28,591,573

Total Incurred Loss:
32,471,048

Emerging Liability:
(3,879,475)

Frequency-Severity Method

4

4 **Frequency-Severity Method**

Pros

Past to determine future

Better consistency

Cons

Lack of efficient data

Underestimation

3 Ultimate Loss Selections

Ultimate Loss Selections

Homeowners Property

2012-2020
Bornhuetter-Ferguson
Method

Auto Liability

2011-2017
Bornhuetter-Ferguson
Method

Homeowners Property

2011
Chain Ladder Method

Auto Physdam

2011-2020
Bornhuetter-Ferguson
Method

Auto Liability

2018-2020
Expected Loss Ratio
Method

4 Standardization

To reduce the amount of time needed to complete the reserve analysis

Recommendation:

Standardize the Personal Auto Physical Damage Line of Business

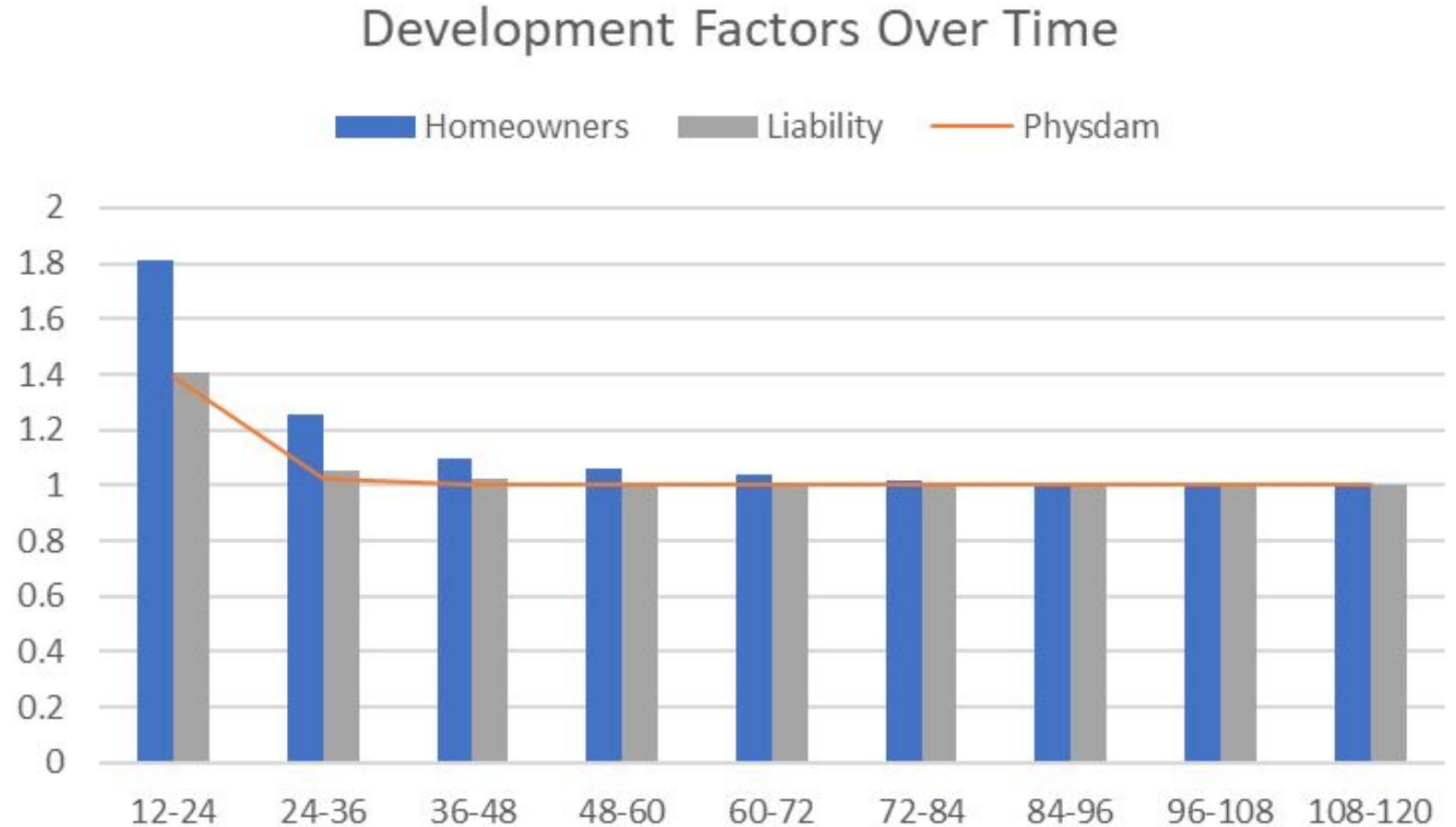**Development factor stabilizes first**

Short payment cycle
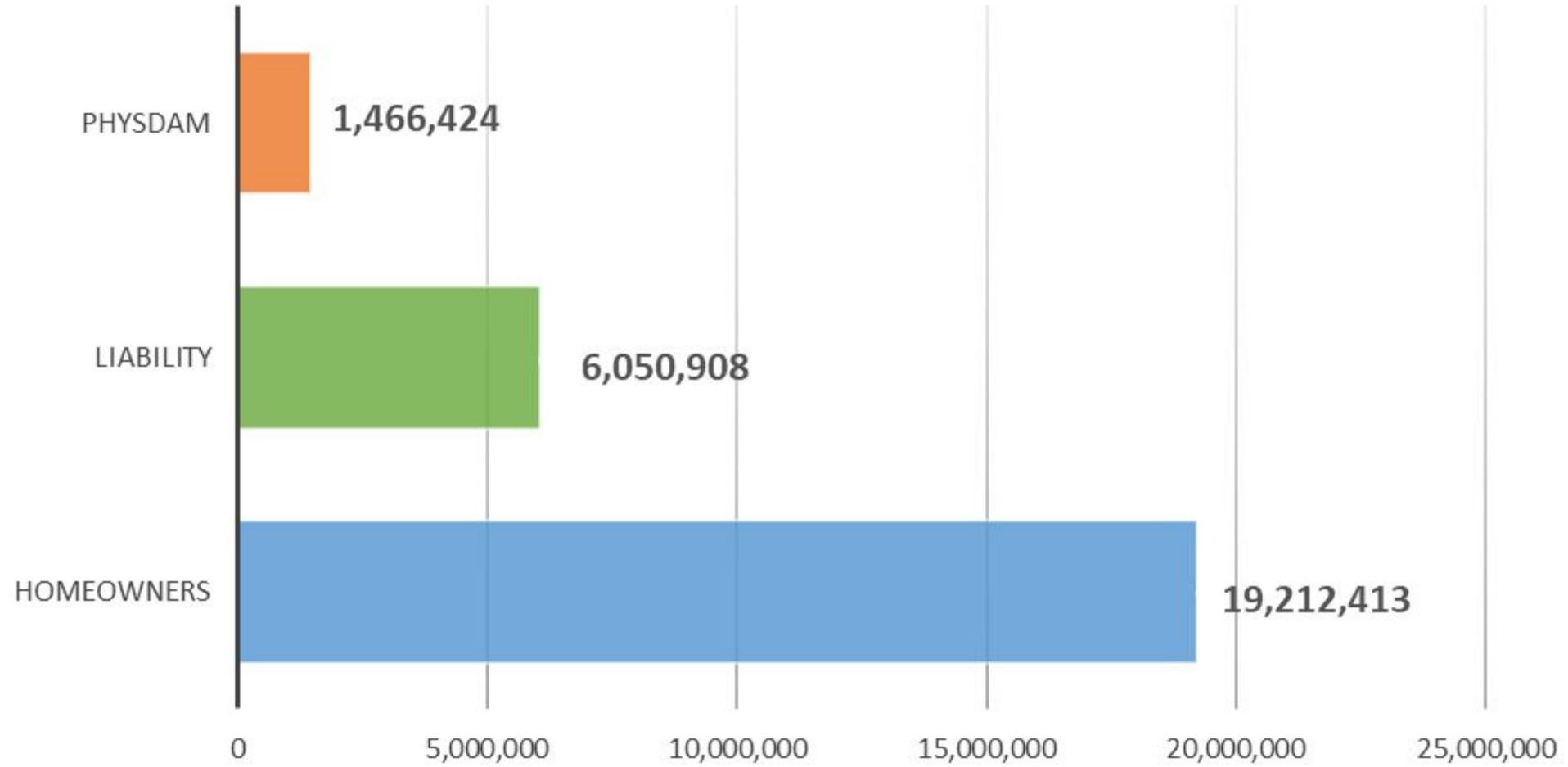
Easier to model

Development Factors Over Time

Legend: Homeowners | Liability | Physdam

X-axis: 12-24, 24-36, 36-48, 48-60, 60-72, 72-84, 84-96, 96-108, 108-120
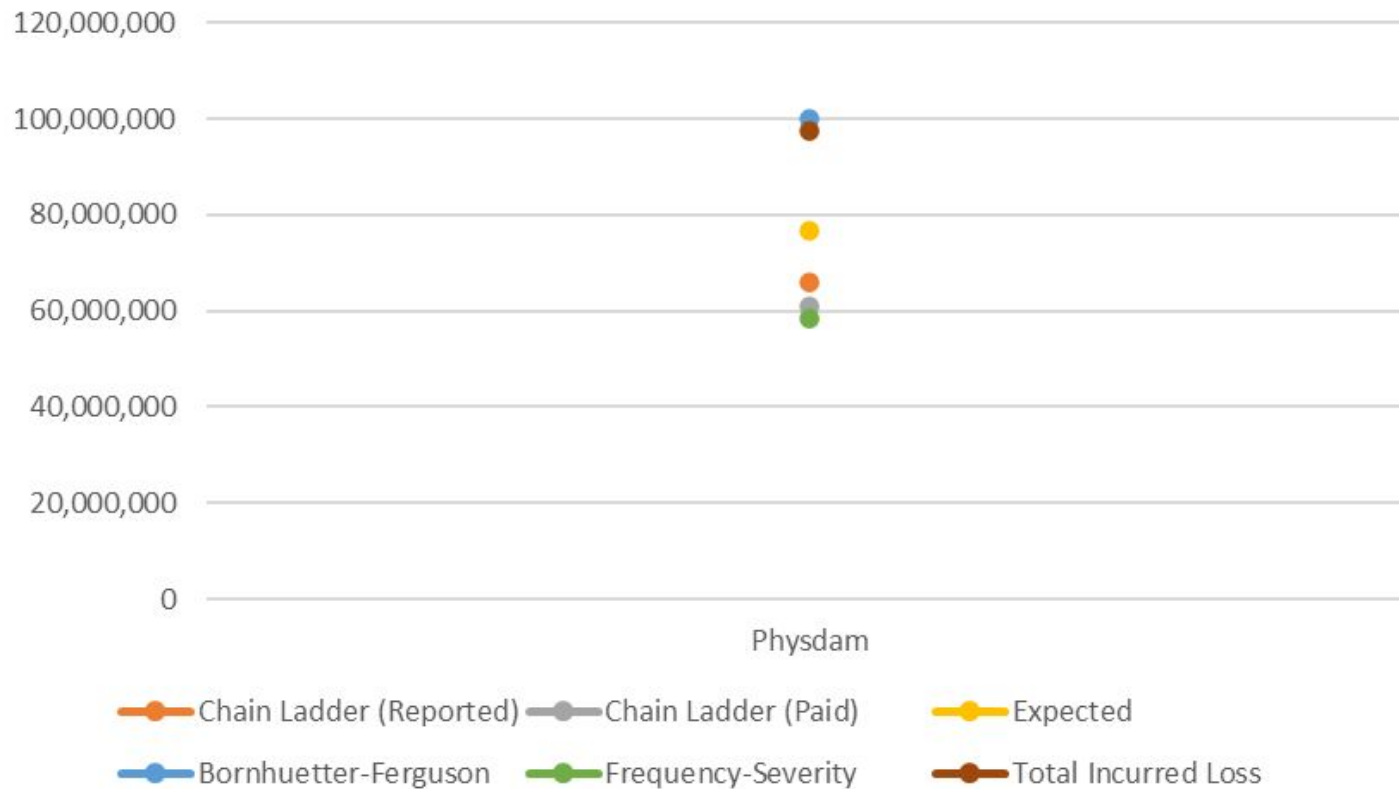
Y-axis: 0 to 2

10-Year Ultimate Loss Range (Paid Chain Ladder)

Method of Choice: Bornhuetter-Ferguson

Total Incurred Loss vs. Total Ultimate Loss Predictions

Total Ultimate Loss Predictions		
Method	**Physdam**	**Liability**
Chain Ladder (Reported)	66,011,648	26,367,701
Chain Ladder (Paid)	60,912,199	22,855,274
Expected	76,827,129	68,179,057
Bornhuetter-Ferguson	99,990,075	35,293,731
Frequency-Severity	58,322,797	28,591,573

Total Incurred Loss	97,615,552	32,471,048

Method of Choice: Bornhuetter-Ferguson
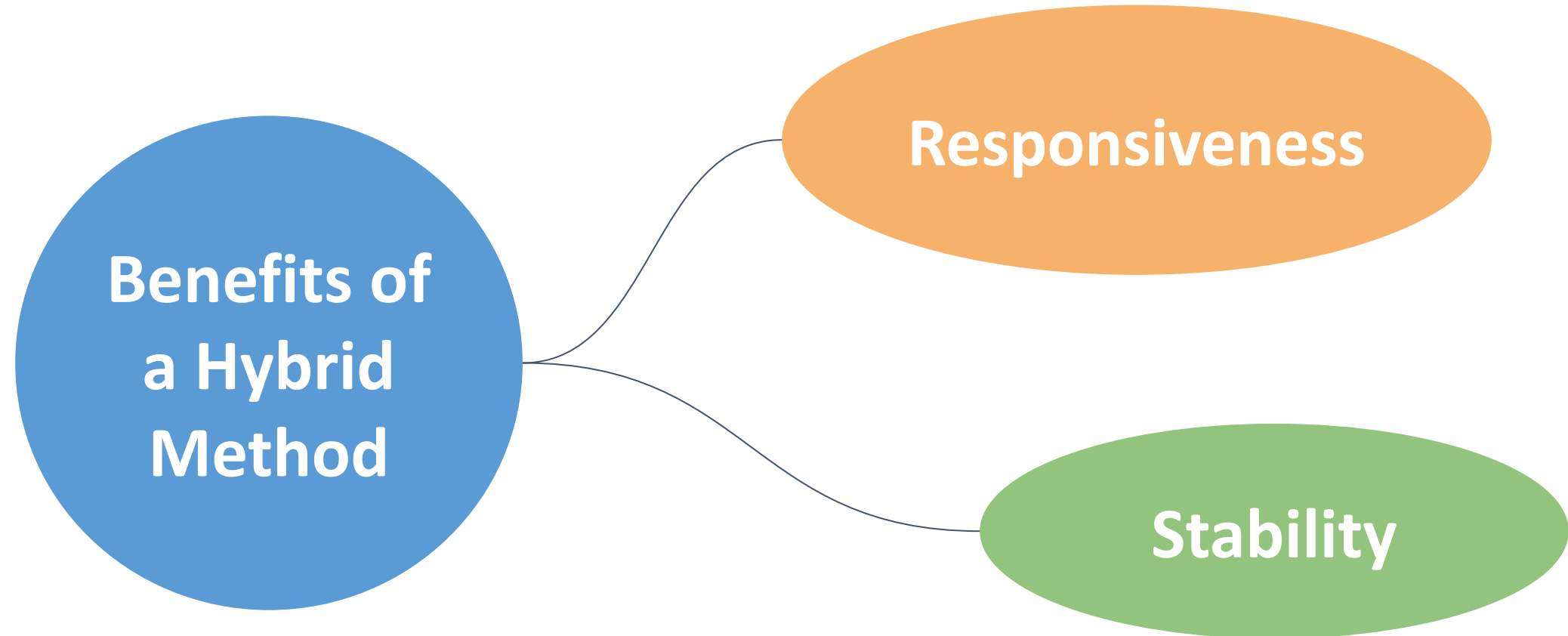
5 CAT Reserving

CAT Reserving

Accumulation

Pre-Tax Basis

Challenges with CAT Reserving

Limited Data

Limited amount of historical catastrophe data

↓

Estimating losses is challenging

Time Difference

Significant gap between accident date and when the loss is settled

↓

Insurance agency can face a greater loss if the exchange rate changes

Increase in Claims

Increase in the number of claims when a catastrophe happens

↓

Insurer has to pay more than what is in the xCAT model and cash flow

Thank you!

Team 14