

# Actuarial Case Reserves

2020 Spring Meeting

May 11, 2020

Presenter: Chris Gross

# Antitrust Notice

**The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.**

**Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding –expressed or implied –that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.**

**It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.**

What is the ideal case reserve from an actuary's perspective?

**One that optimizes the actuary's ability to perform.**

# Actuarial uses of case reserves

- Development in loss triangles
- Allocation of total reserve estimate
- Input for pricing analysis

# Qualities of an Ideal Actuarial Case Reserve

- Stability (constant adequacy over time)

# Impact of change in mix on stability

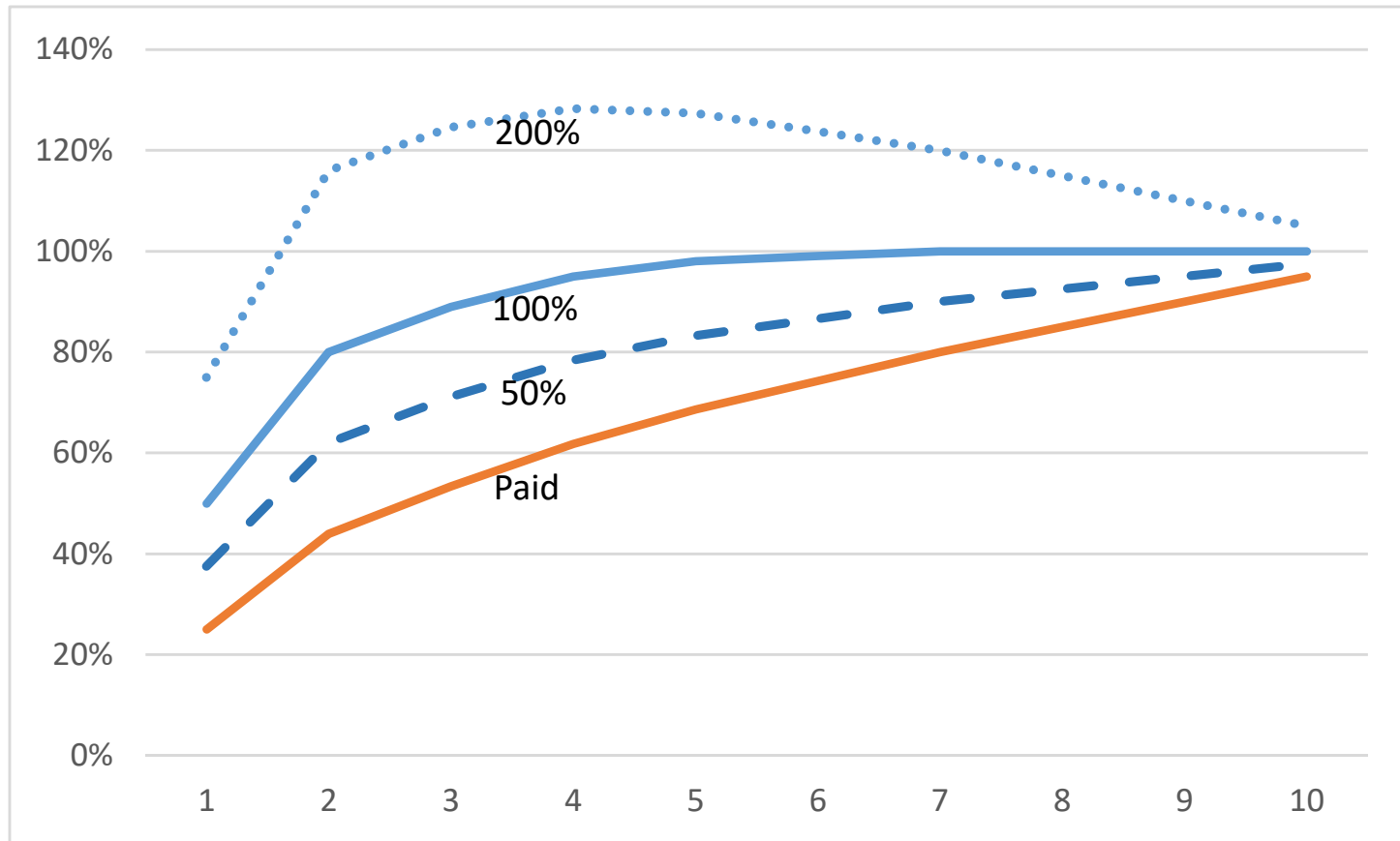
- Rarely true that types of claims are equally adequate. Differences usually exist by deductible, geography, industry classification, size of account, cause of loss, injury type, etc..
- Change in Mix => Change in Adequacy.
- It is rarely true that there is NO change in mix is occurring along any particular dimension.
- Therefore case adequacy is constantly changing.

# Qualities of an Ideal Actuarial Case Reserve

- Stability (constant adequacy over time)
- Uniformity (constant adequacy across population)

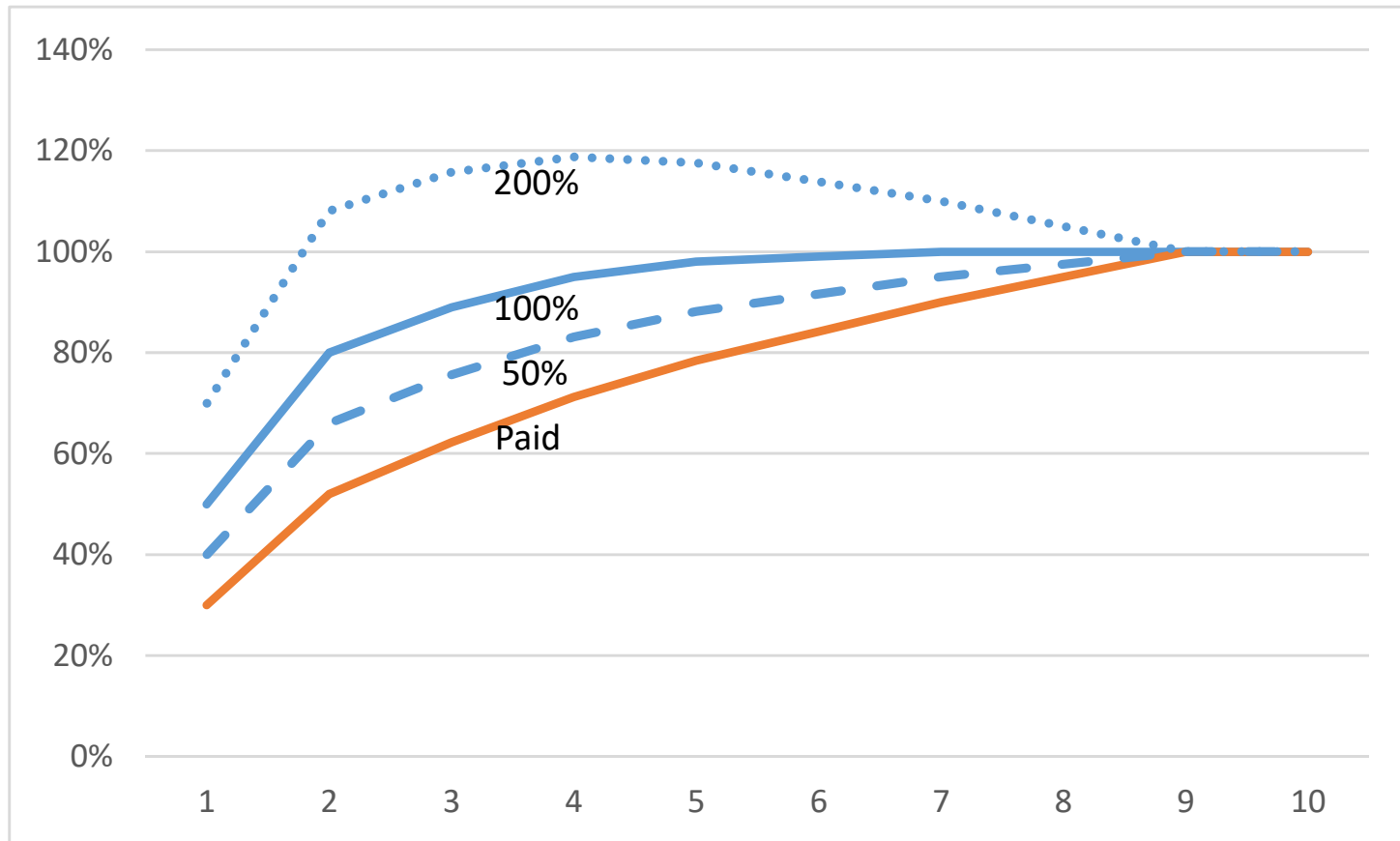
When we talk about the above two are we talking about case reserves by themselves or in conjunction with payments?

# Impact of claim payment speed up





# Impact of speed up



# Qualities of an Ideal Actuarial Case Reserve

- Case Res =  $E(\text{future payments} \mid \text{available information})$ , i.e. adequate
- Consistent determination over time
- Objective

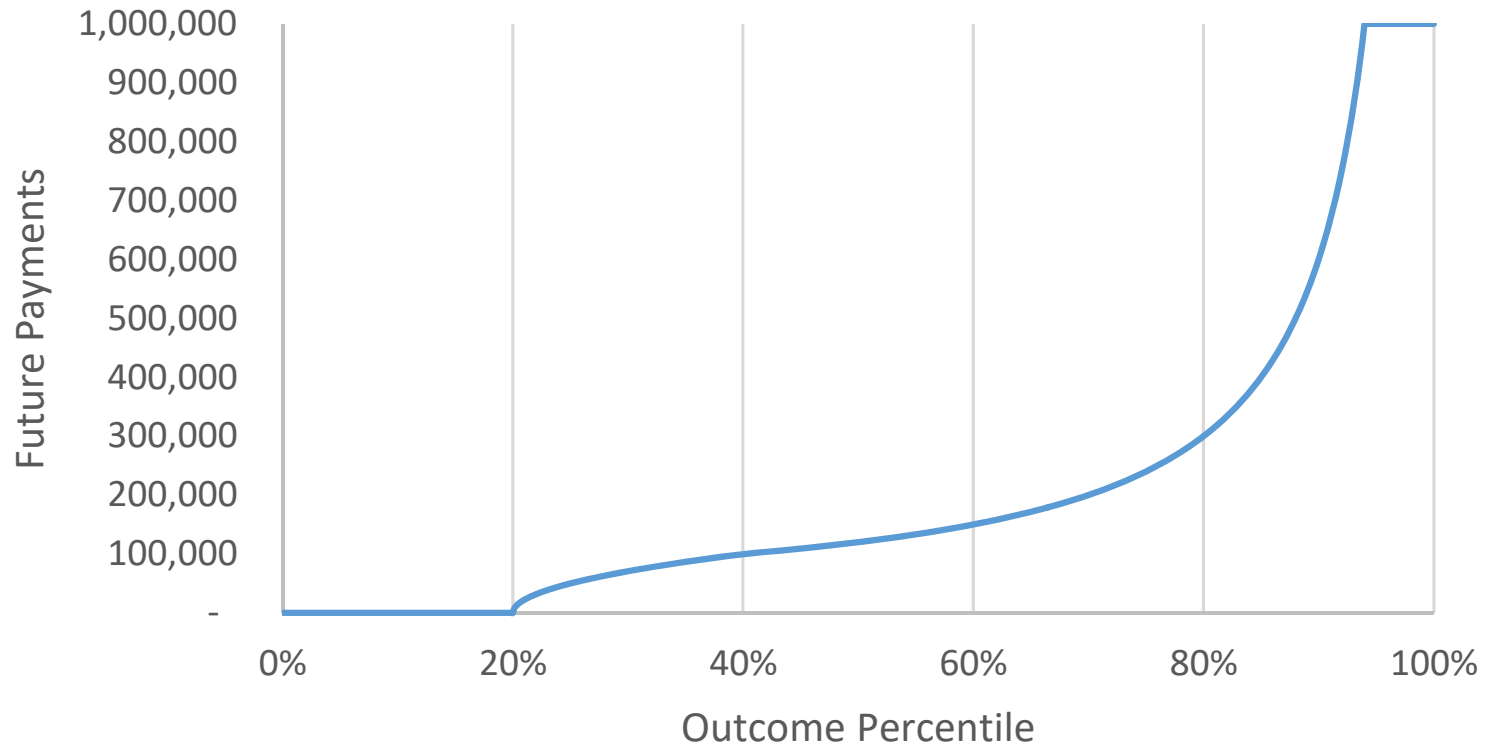
What is the ideal case reserve from a claim department's perspective?

**One that optimizes the claim department's ability to perform.**

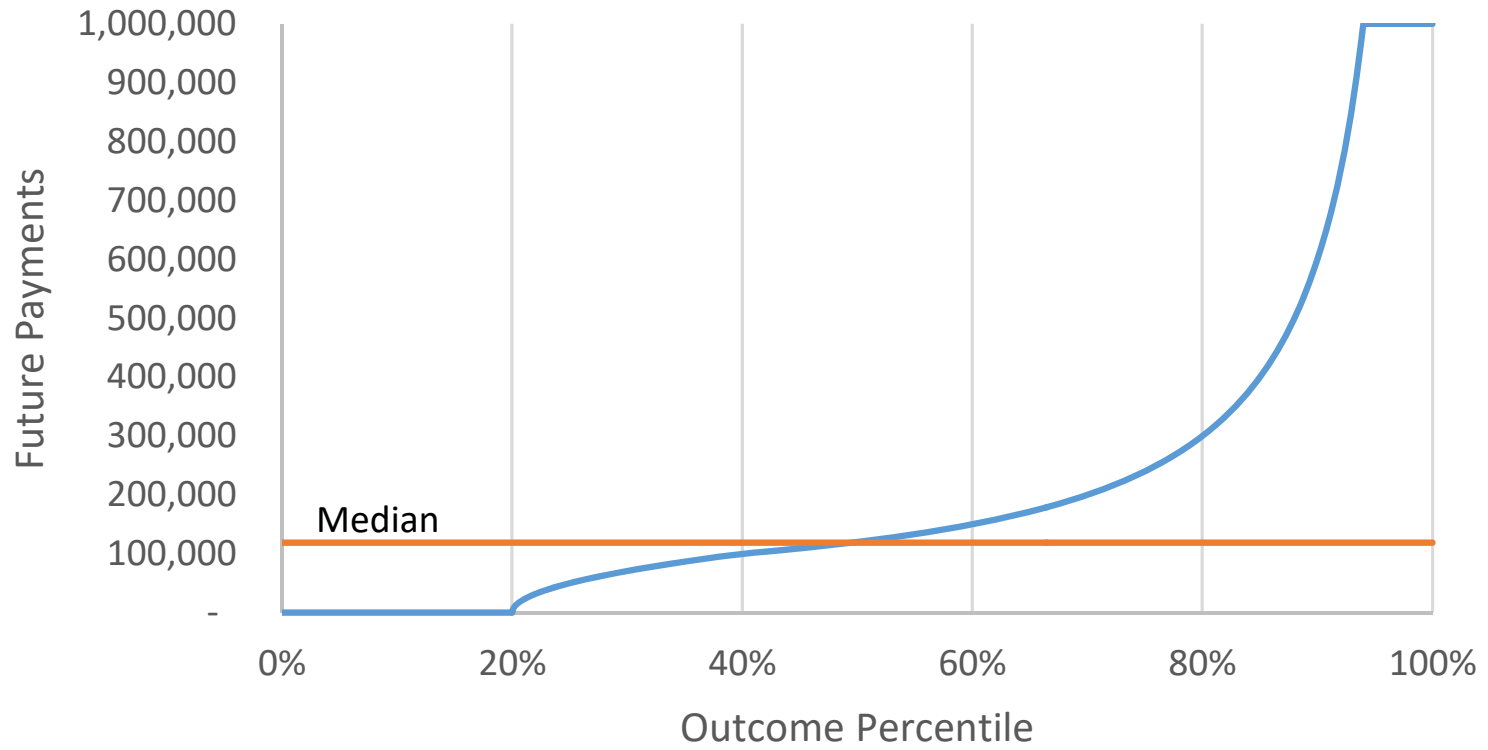
# Claim Department Uses of Case Reserves

- Communicate their opinion
- Benchmark for negotiation
- Benchmark for performance

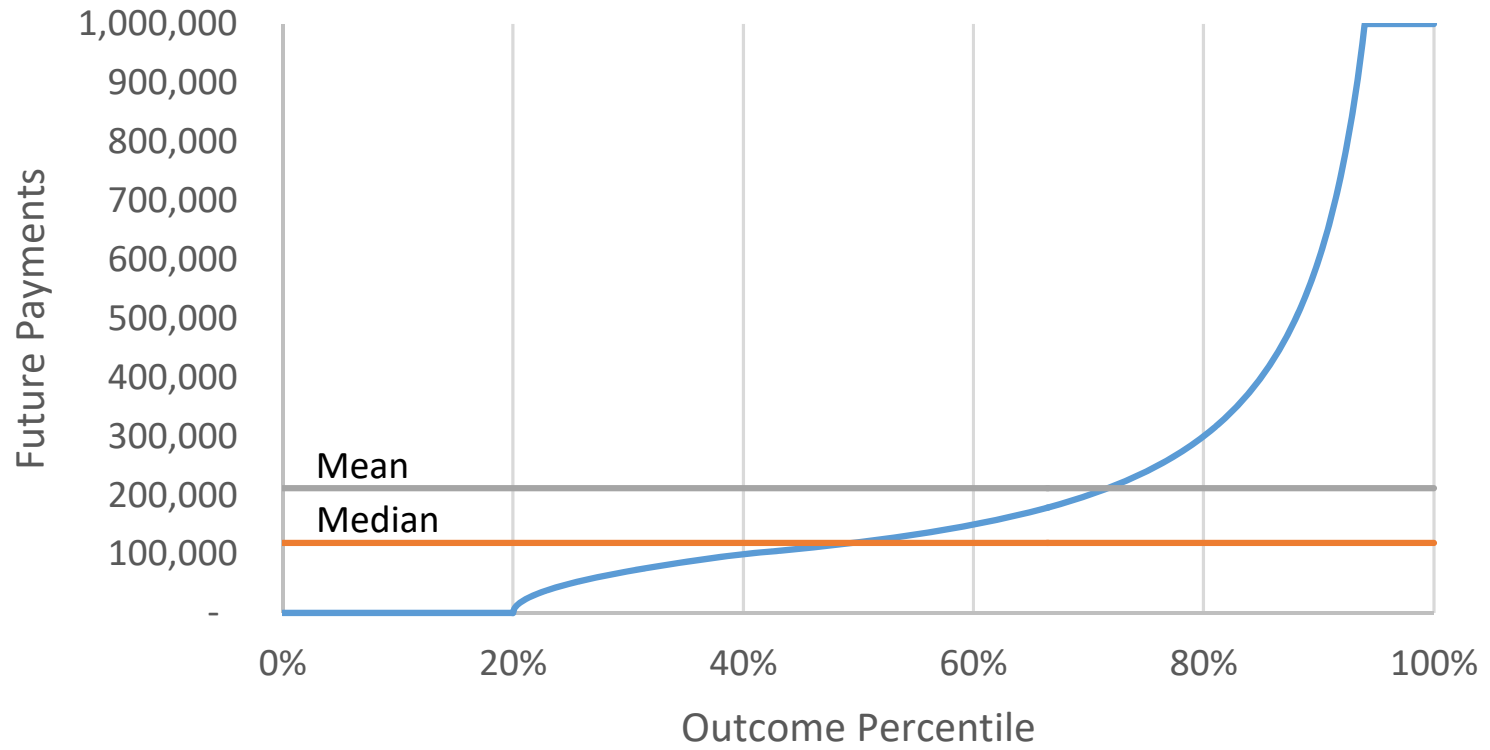
# Claim X



# Claim X



# Claim X



# Historical plea from actuary to claim department

- Don't change things!
- Unrealistic
- Suboptimal with regard to outcomes



# The solution

- Two separate case reserve estimates
  - One controlled by the claim department for their purposes
  - One controlled by the actuarial department for their purposes
  - Comparison and discussion where appropriate

# Use of Actuarial Case Reserves

## -General Process

- Build an actuarial algorithm for case reserves
- Apply to every open claim at each triangle point
- Replace historical case reserves
- Organize into triangle
- Generalization of Berquist-Sherman

# Variables to include

- Age of claim
- Payments to date
- Recent payments
- Claim variables
- Exposure variables
- Limit Remaining
- Time component?
- NOT the current case reserve

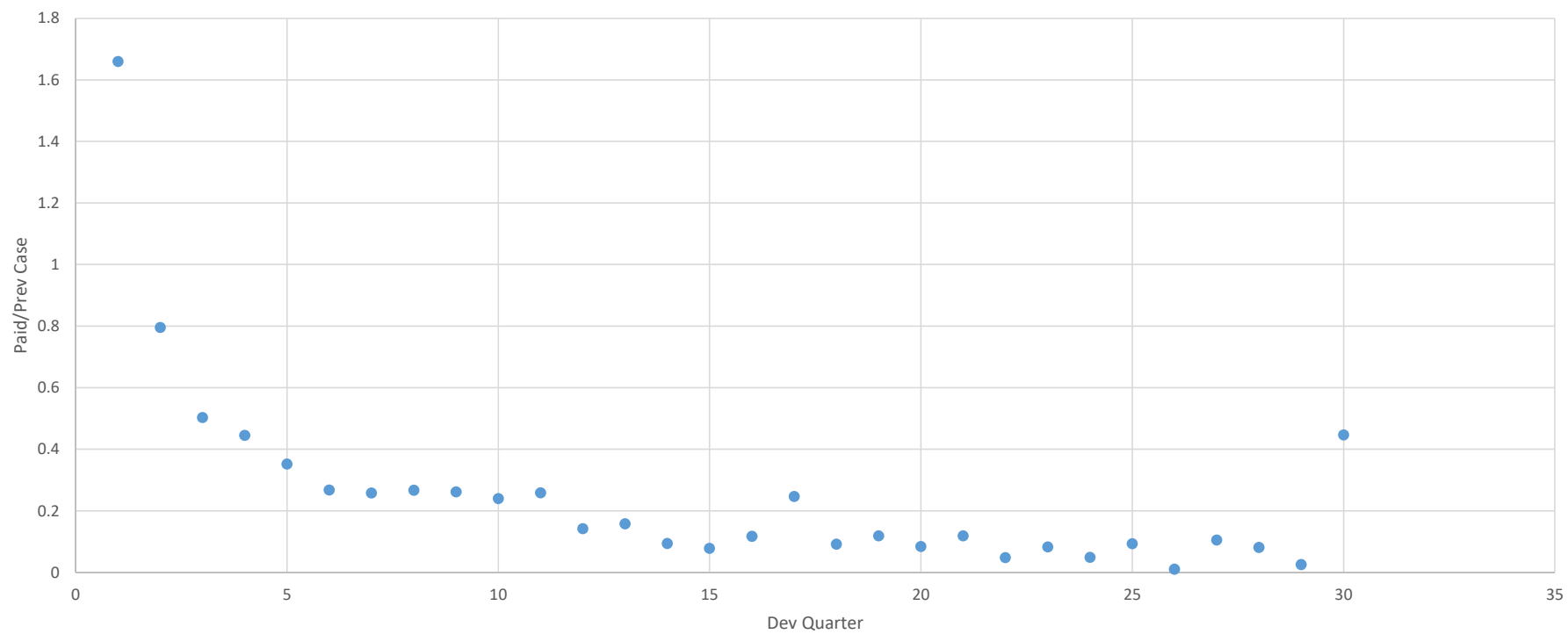
# Predictive Modeling

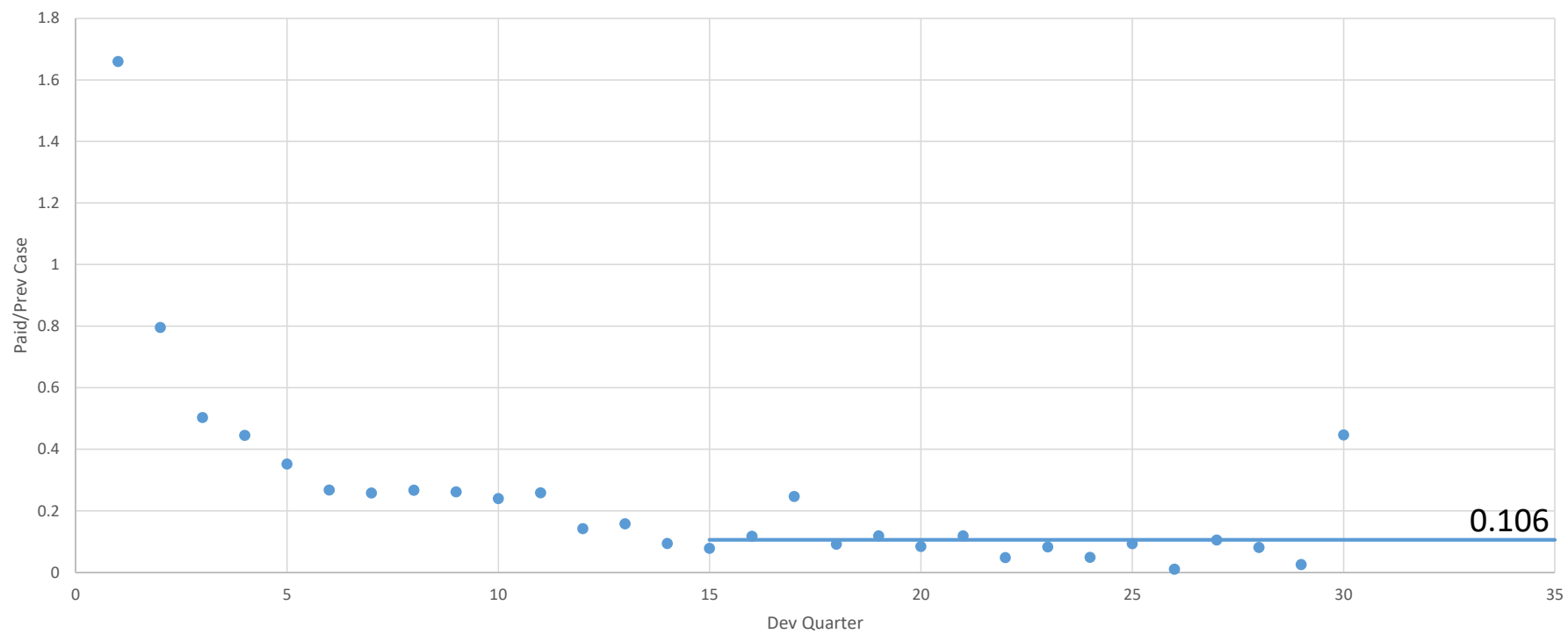
- Test/Validation with out-of-sample data
- Seek parsimony
- Consider timing/consistency of predictive variables

- Data slide

# Adjustment to Current Case

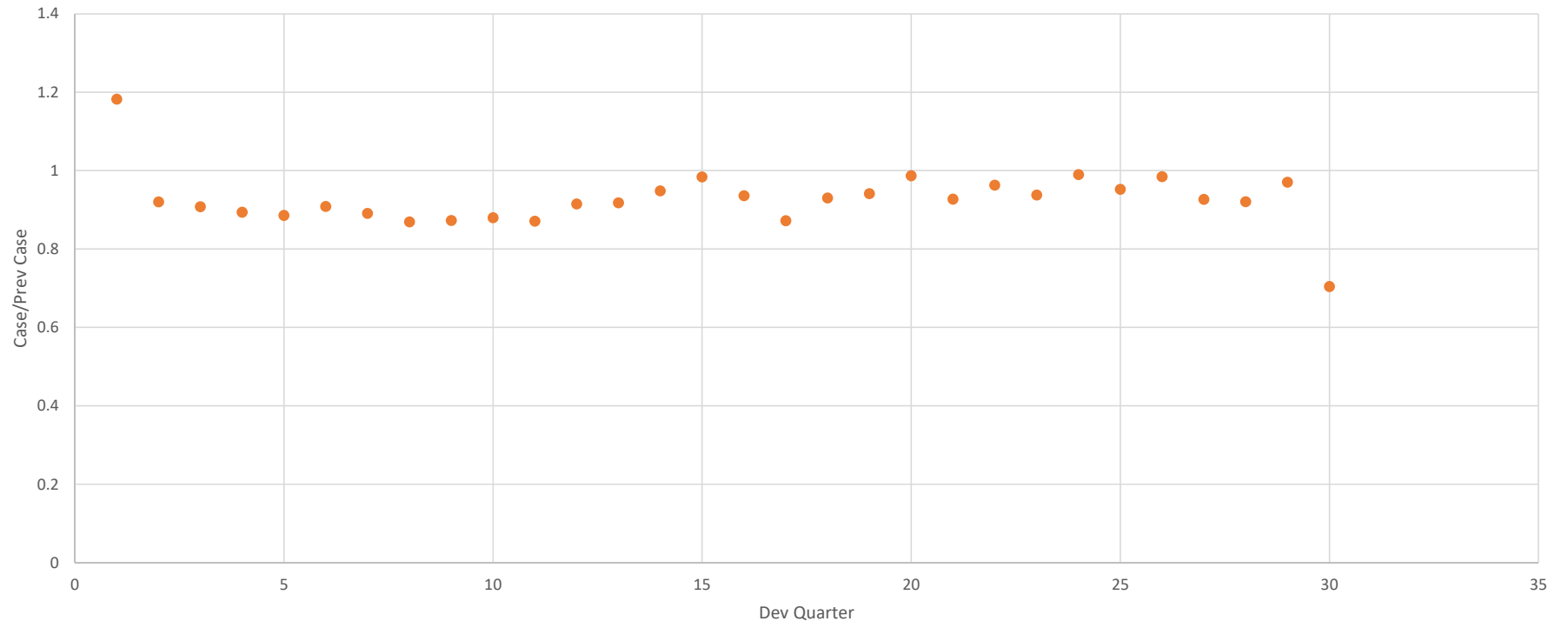
- It is likely that some known biases are already understood – general or specific
- In the specific case, individual development models may have been built to study the behavior of case reserves
- In the general case, IBNER might already be expected.
- In either case, adjustment is appropriate before building the actuarial case algorithm
- Marker-Mohl backwards-recursive approach, applied to “report-period by age” triangles is an easy starting point (develops factors that are applied to case reserves as of a certain age)

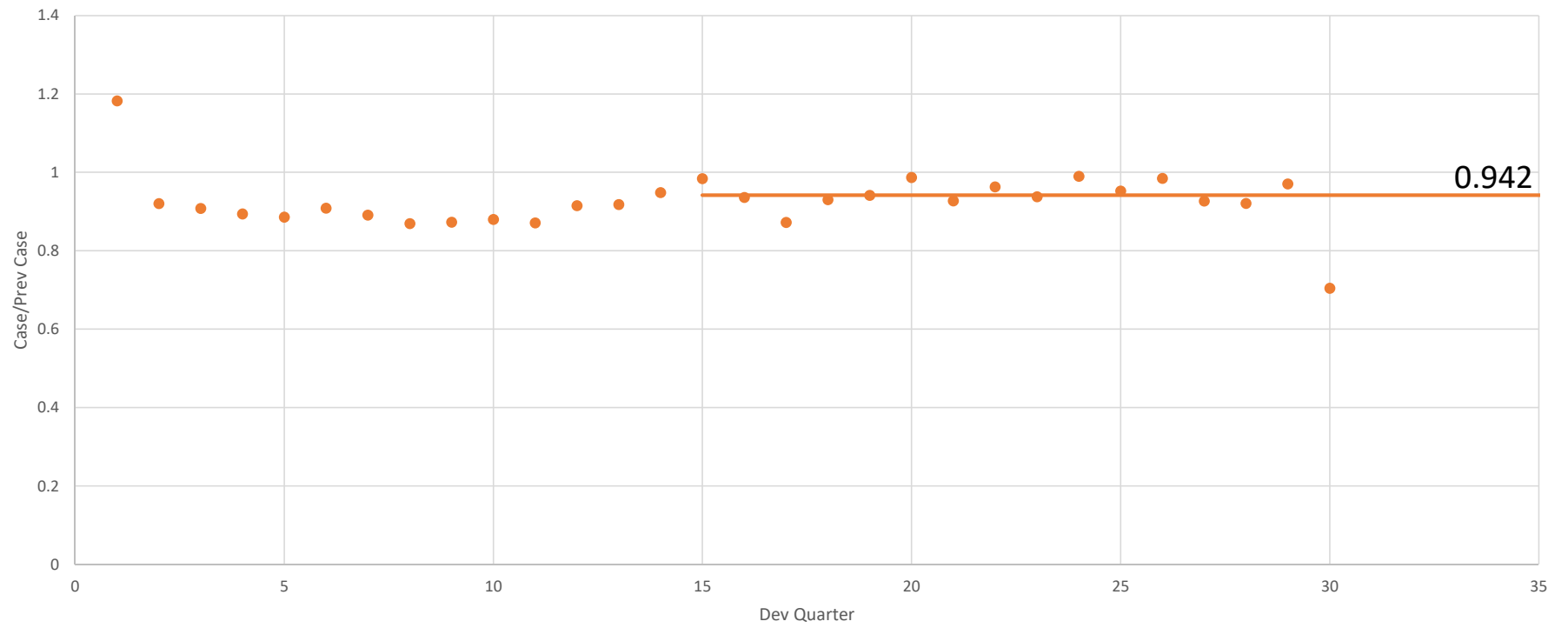




0.106

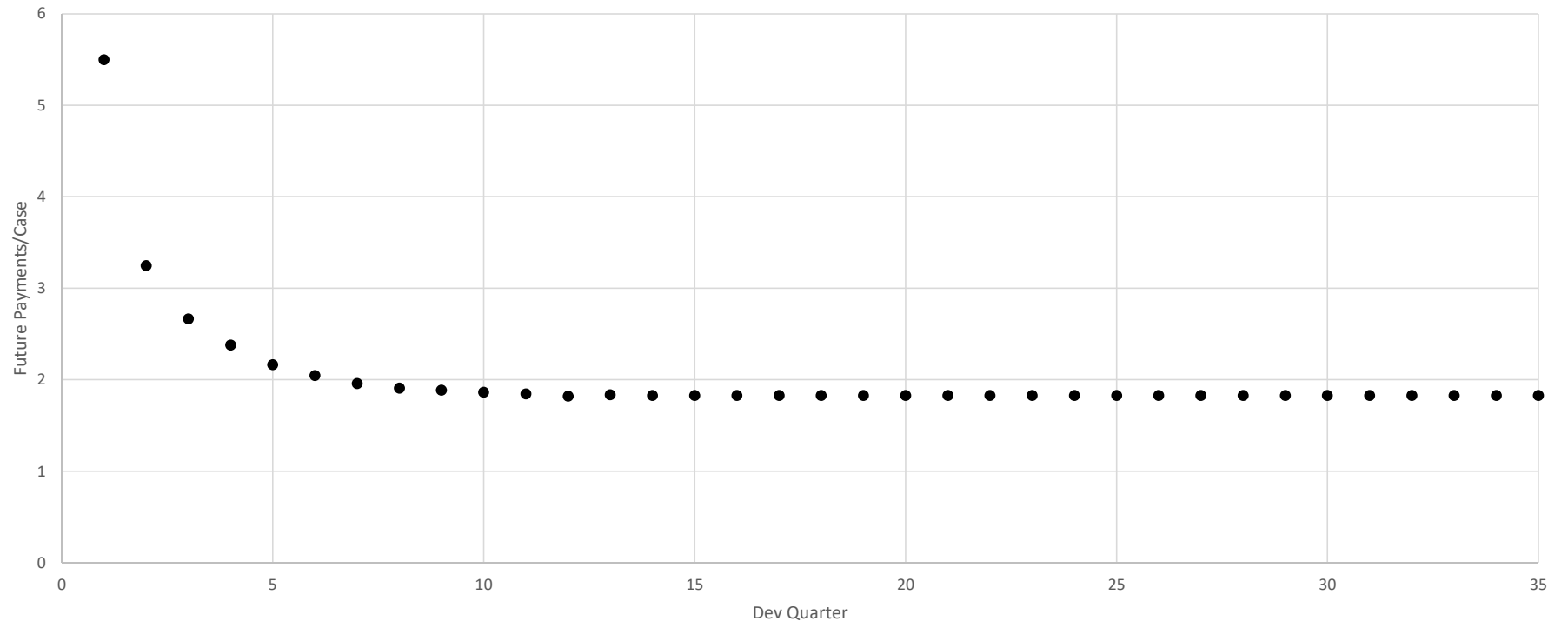






## Stationary Case Settlement (Tail development)

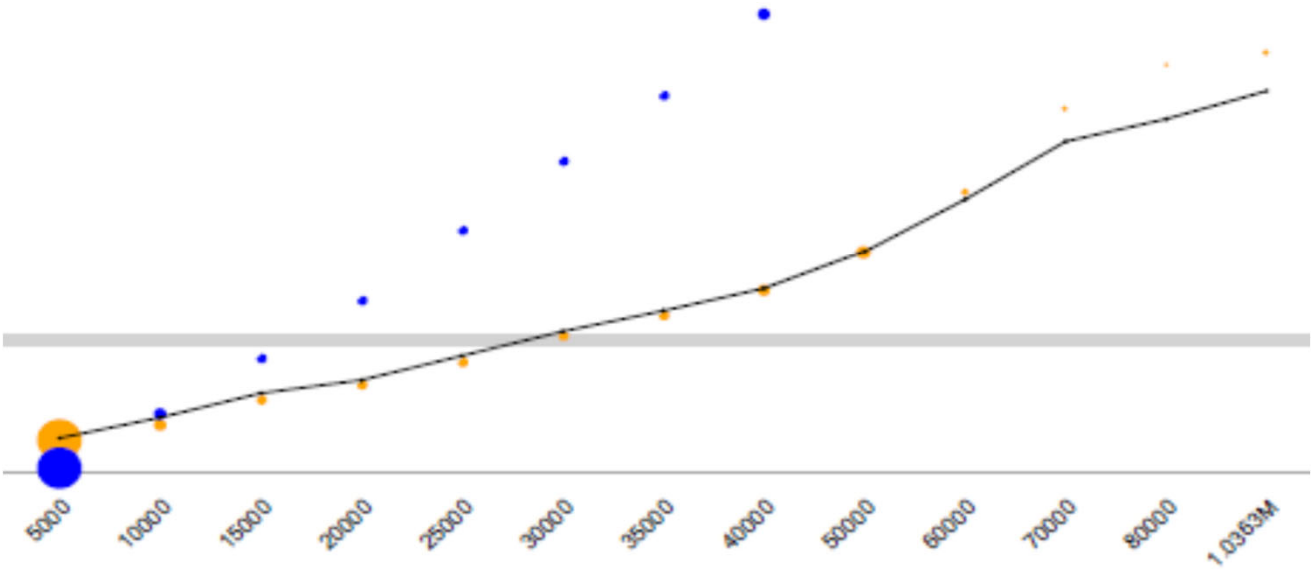
- Incremental paid/ previous case of 0.106
- case/ previous case of 0.942
- Translates to future paid/ current case =  $0.106/(1 - 0.942) = 1.828$



# A good path to get started

- Organize data into report quarter triangle
- Calculate backwards-recursive factors
- Apply to current case reserves as a starting point
- Build the case algorithm (predictive model)
  - target future payments as of historical evaluations (including the adjusted case reserves as of now)
- Apply historically to triangle (can be accident period)

Indemnity Case Reserves Factor



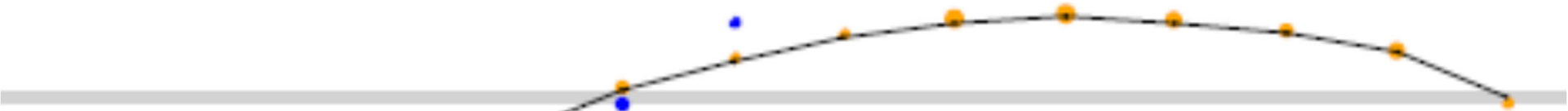
Most recent year's indemnity payments

Indemnity Case Reserves Factor



Claim Status

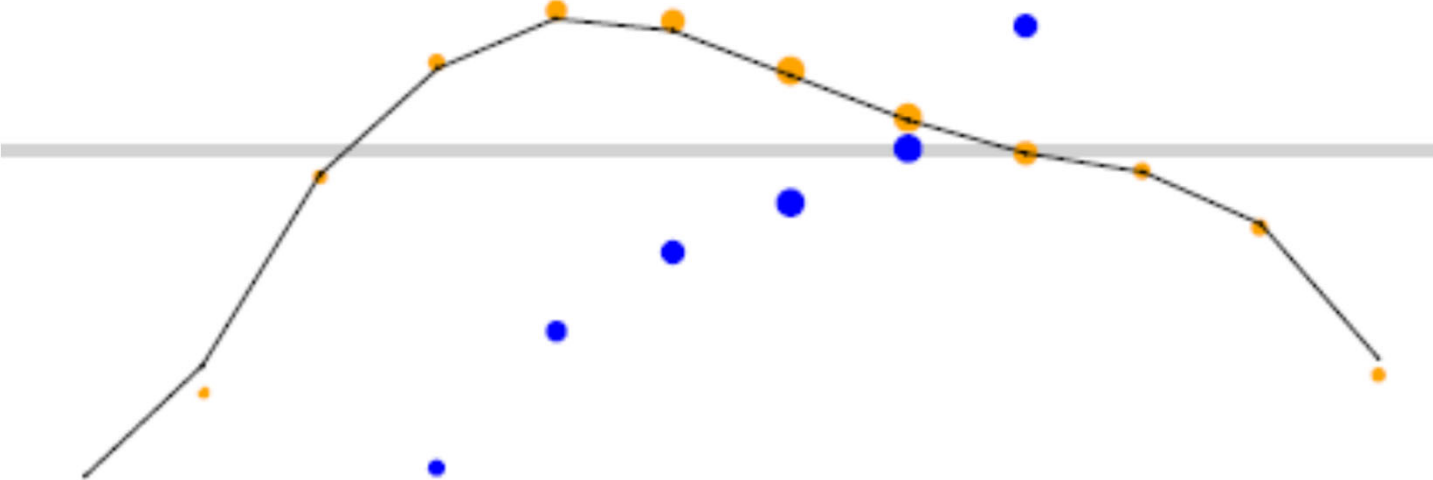
Indemnity Case Reserves Factor



Years since injury

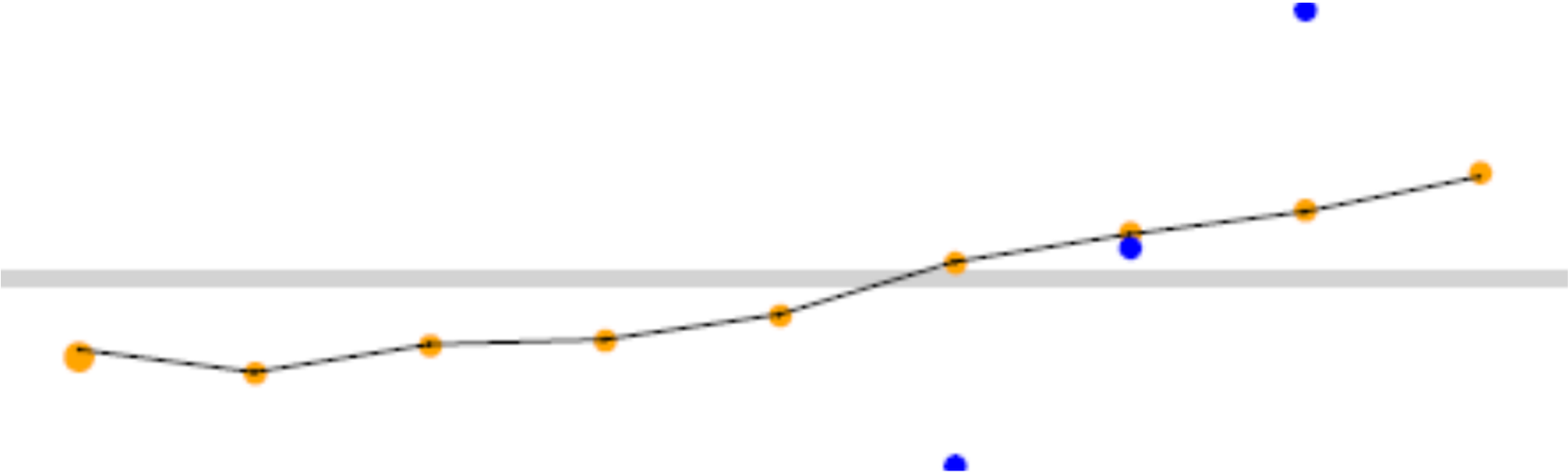


Indemnity Case Reserves Factor



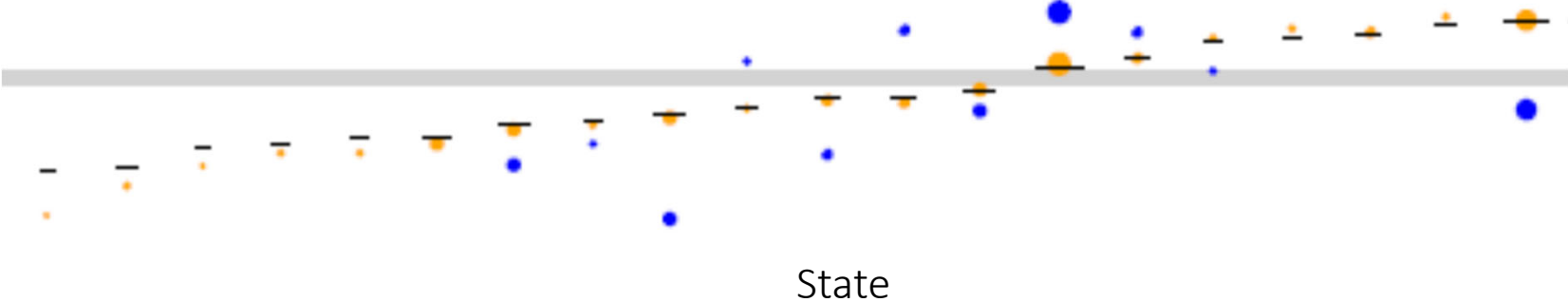
Years since birth

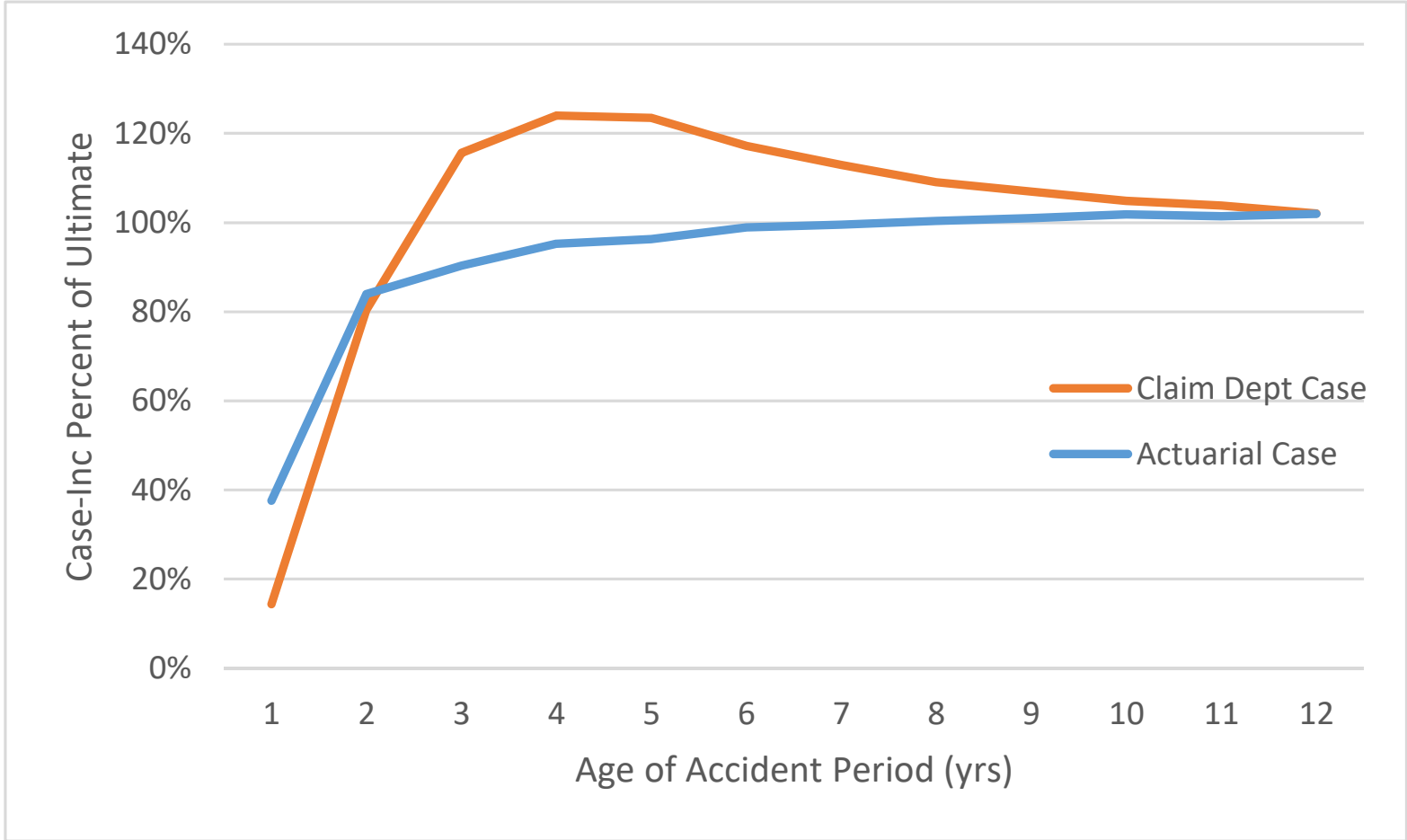
Indemnity Case Reserves Factor



Most recent year's medical payments

Indemnity Case Reserves Factor





# Complications

- Inability to apply algorithm to all historical claims
  - Adjust case reserves instead of building triangle directly
- Date of case reserve valuation date as a variable
  - Potentially important to reflect trend
  - Potentially at odds with goal of being consistently applied
  - Potential proxy for development age
  - Use with care (i.e. actuarial judgment)
- Dynamic Variables
  - Make sure to capture “as-of” value

# Updates

- No need to go through the whole predictive modeling process each reserve analysis
- Simply re-apply the algorithm
- Revisit the algorithm less frequently or as new variables present themselves
- Not unusual to end up with different level of adequacy after adjustment, despite goal of 100%
  - With consistent application across triangle development factors should adjust