

Best Practice Pricing Analysis

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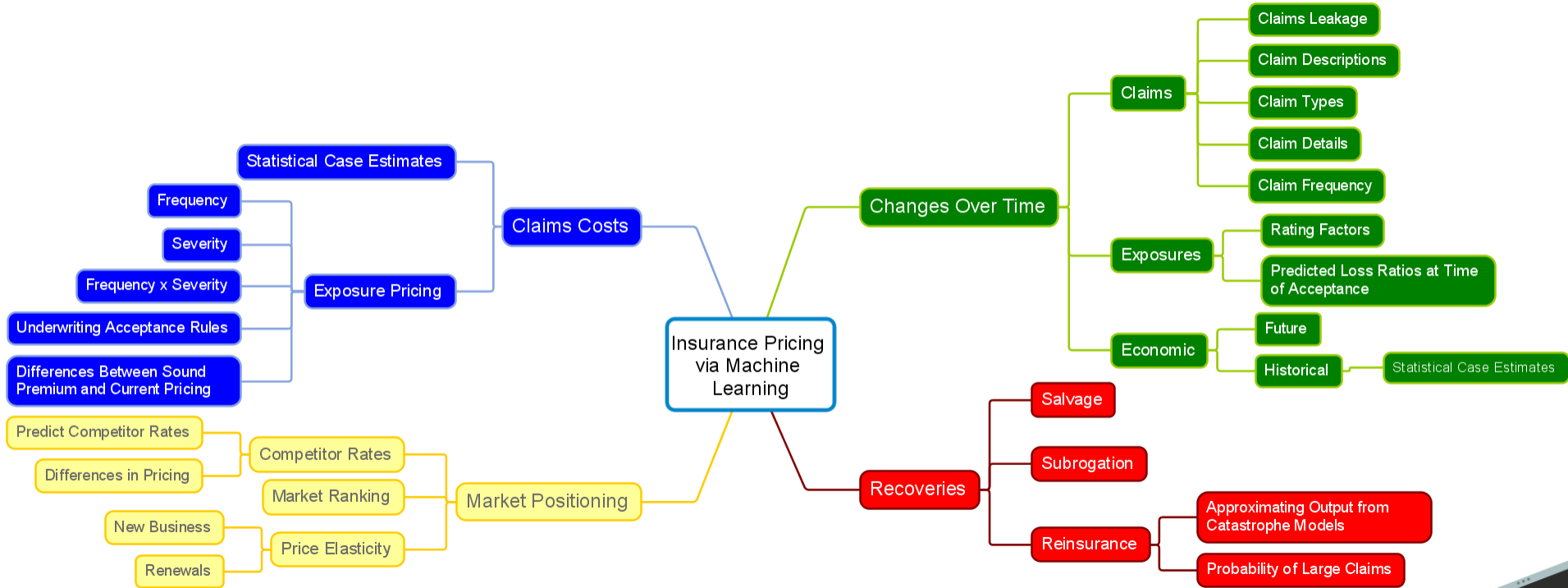


Agenda

- Pricing analysis involves more than technical exposure pricing
- You must start by checking what has changed in the past
 1. Look for changes in exposure over time
 2. Look for changes in claims frequency over time
 3. Look for changes in the severity and nature of claims over time
 4. Choose an appropriate historical time period and inflation adjustment, informed by the previous 3 points
- Then, and **only then**, you can do **technical pricing**
- Finally, you will do commercial pricing allowing for competitor rates, marketing ranking, and price elasticity
- This is a lot of work, so **automate** it!



Machine Learning and Insurance Pricing



**The Past is Not Always
Indicative of the
Future...**

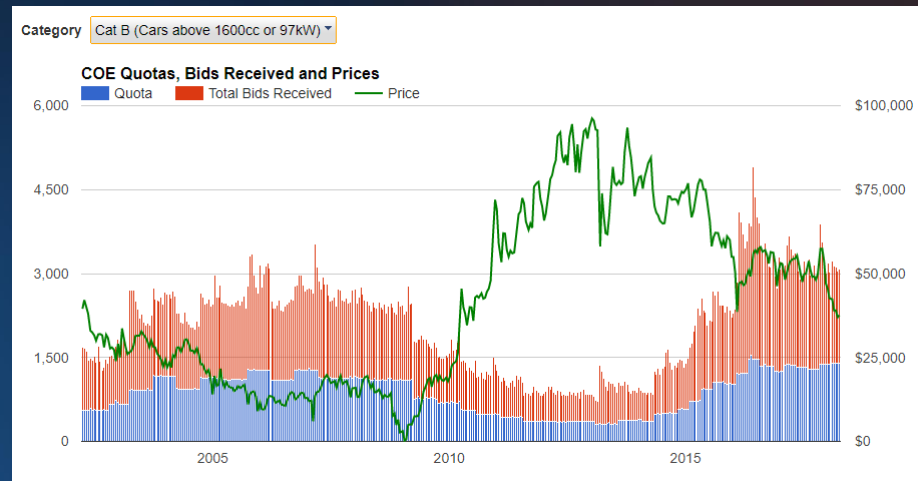


Vehicle Quotas

Higher COE

Changing age profile of vehicles

Changing profile of owners



The Grab Effect

Higher vehicle utilisation

More traffic congestion





Actuarial Analysis is Backwards Looking





Is A Historical Period
Indicative of the Future?





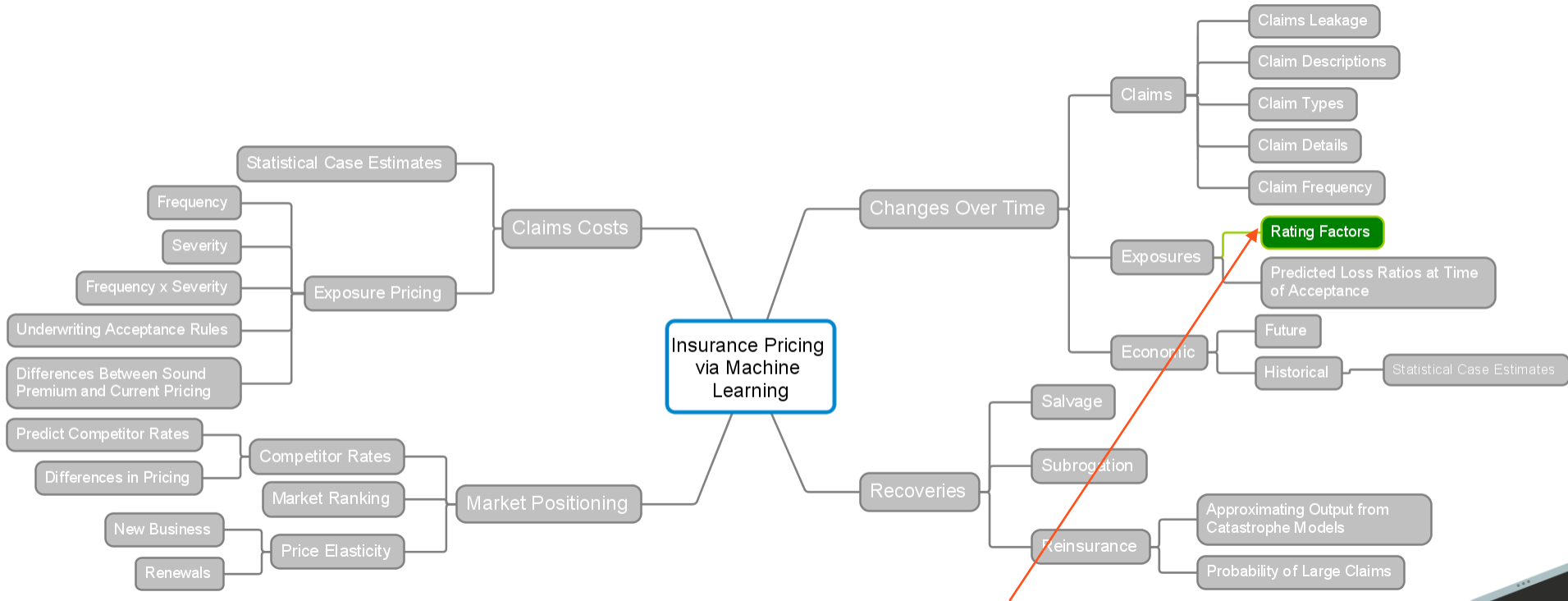
Choose a Historical Period
That is Credible But Relevant



Step 1: Changes in Exposure



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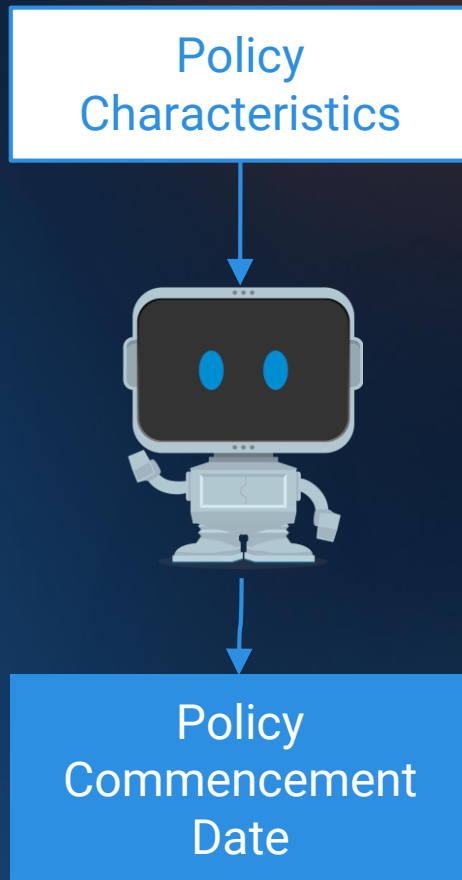


Key drivers of claim costs and stability over time.

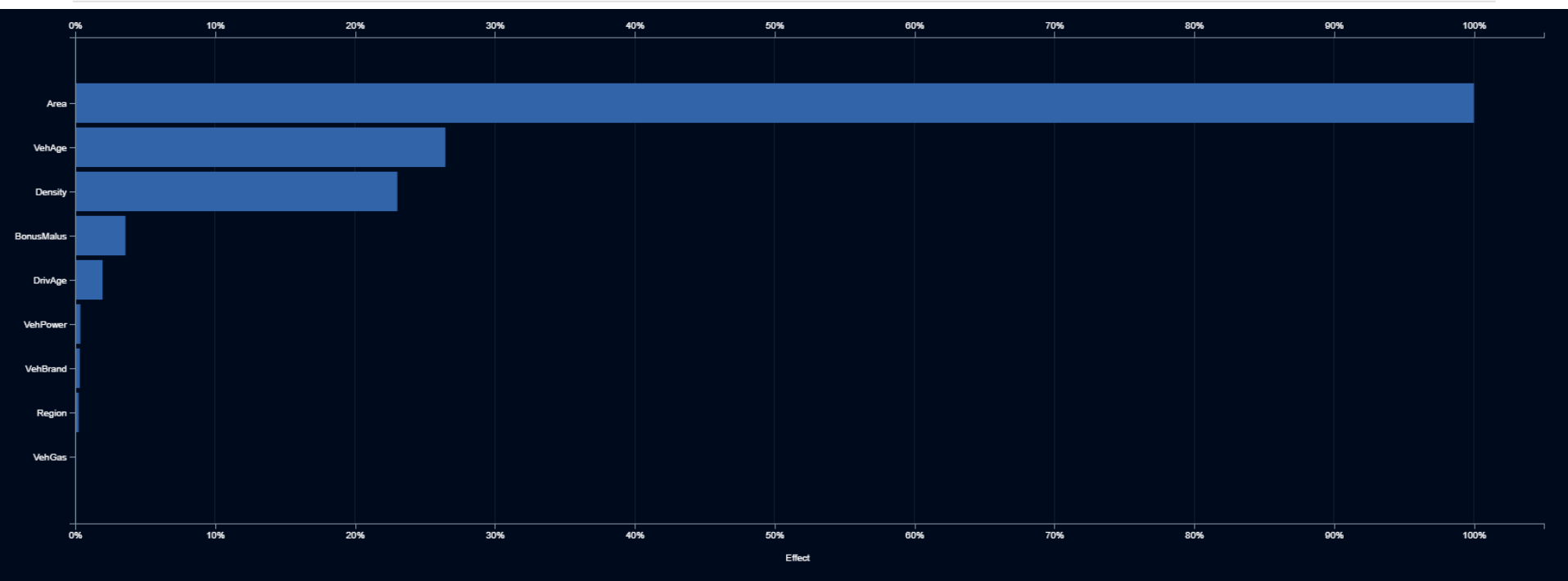
Objective: Discover Whether You Are Writing Different Risks

This can affect your profitability and the relative importance of different rating factors.

It may also indicate anti-selection.



What Does The Output Look Like?

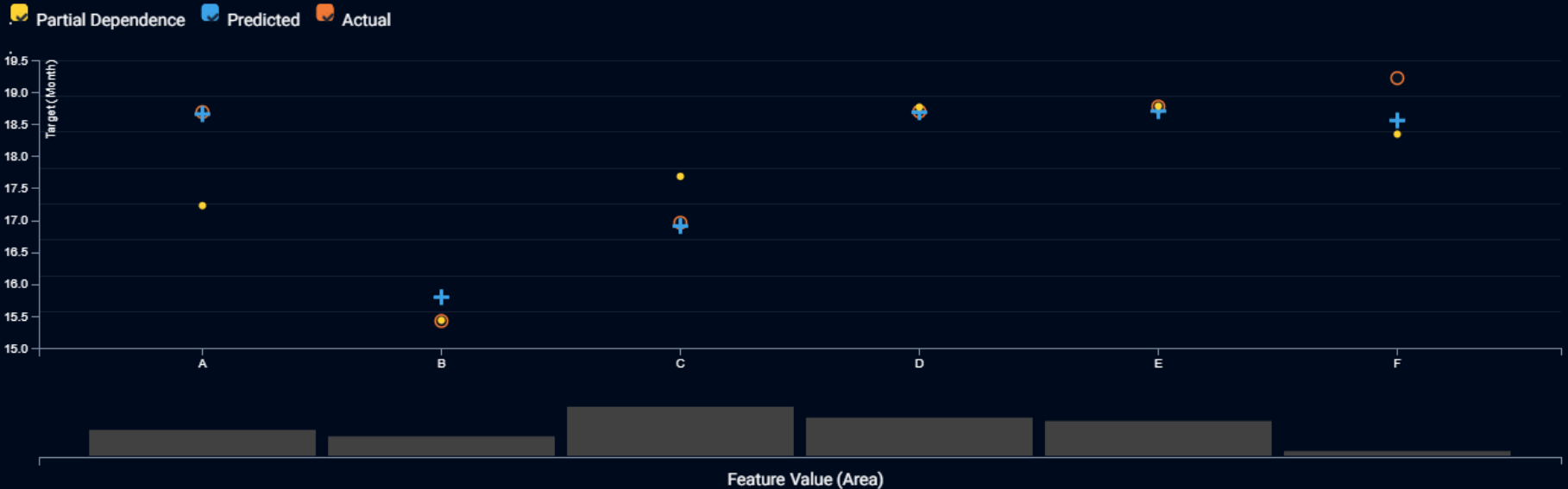


Feature Impact can identify the exposure factors with the most significant changes in your portfolio.

In this case the geographic mix and vehicle age mix are changing.



What Does The Output Look Like?



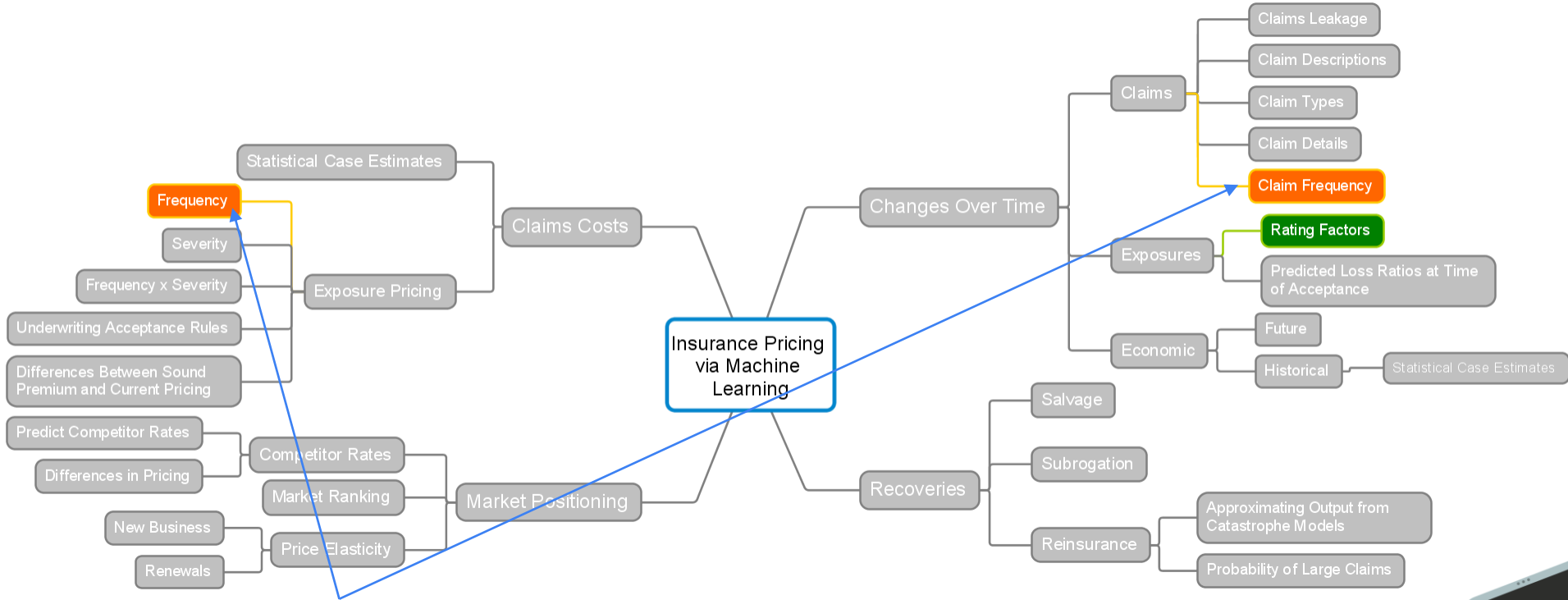
Feature Effects can show the details for the change in mix.
In this case the insurer is writing less business in regions B and C.



Step 2: Changes in Claim Frequency



Step 2: Changes in Claim Frequency



Key drivers of claim frequency and stability over time.

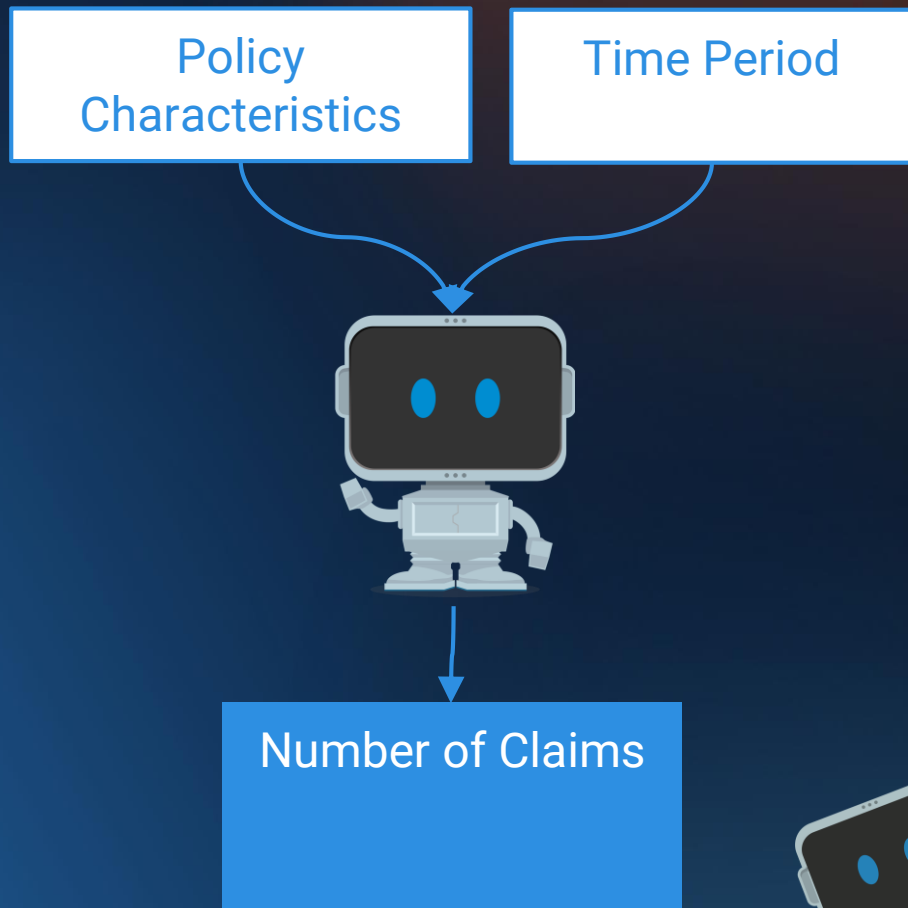


Objective: Discover If Claim Frequencies Are Stable

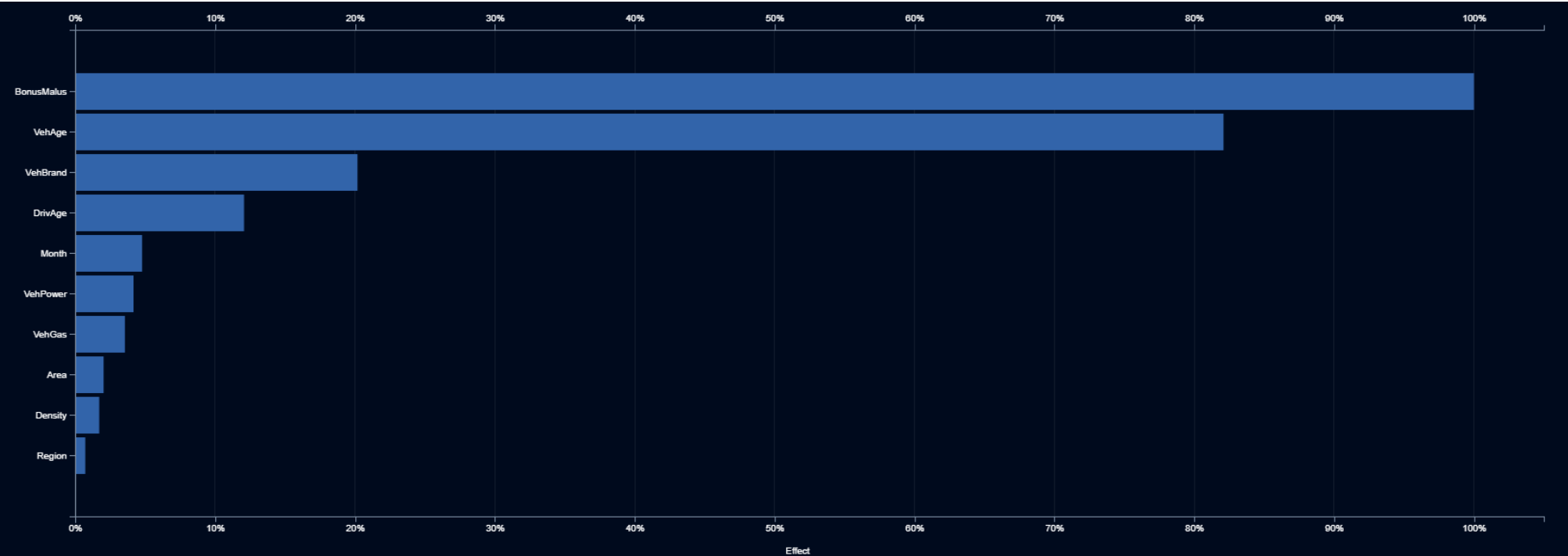
Total frequencies e.g. due to increased congestion.

Frequencies for portfolio segments e.g. are young drivers getting better or worse?

This can indicate anti-selection.



What Does The Output Look Like?

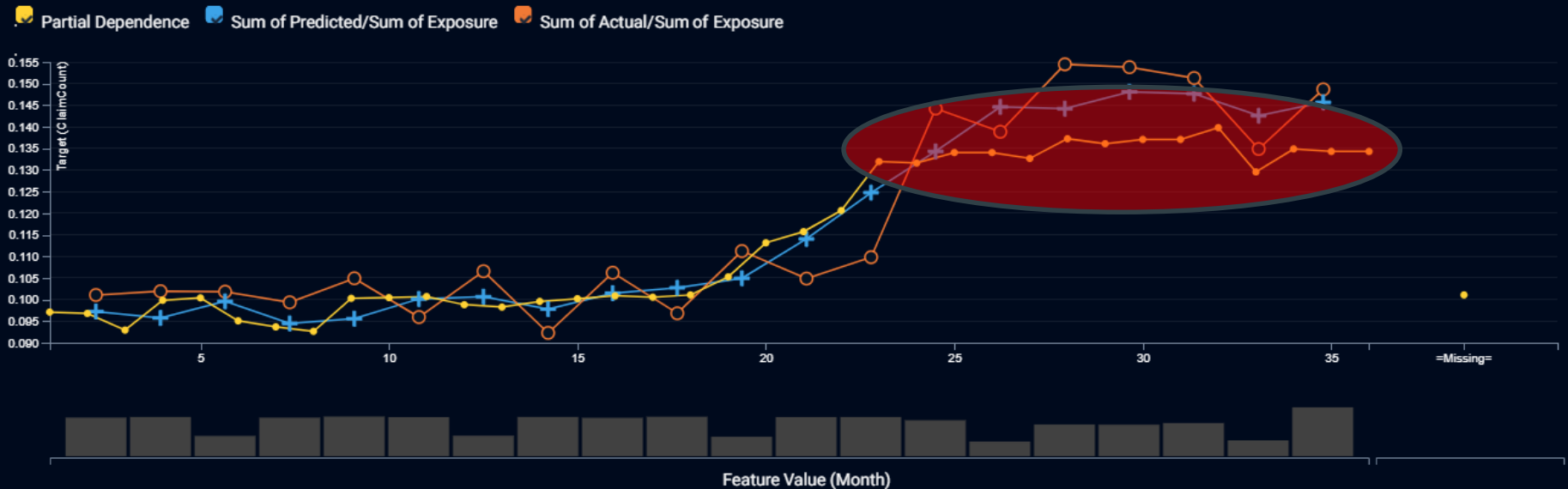


Feature Impact can identify the most important rating factors in your portfolio.

In this case the strongest effect is the bonus malus (e.g. NCD) level, but the policy commencement month is also important, indicating a time-related change in the claim frequency.



What Does The Output Look Like?



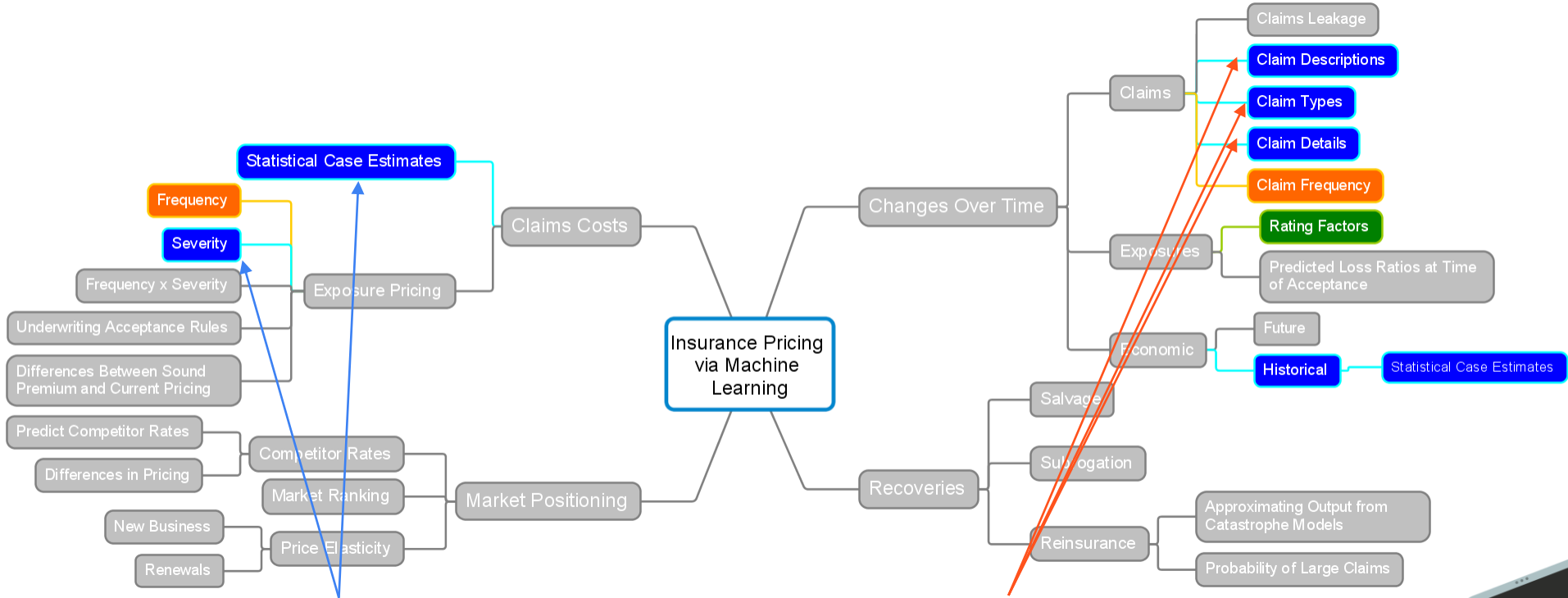
Feature Effects can show the details for the rating factor effects on claim frequency. In this case the claim frequency started increasing 18 months ago and stabilised 12 months ago.



Step 3: Changes in Severity and Nature of Claims



Step 3: Changes in Claims



Key drivers of claim severity.

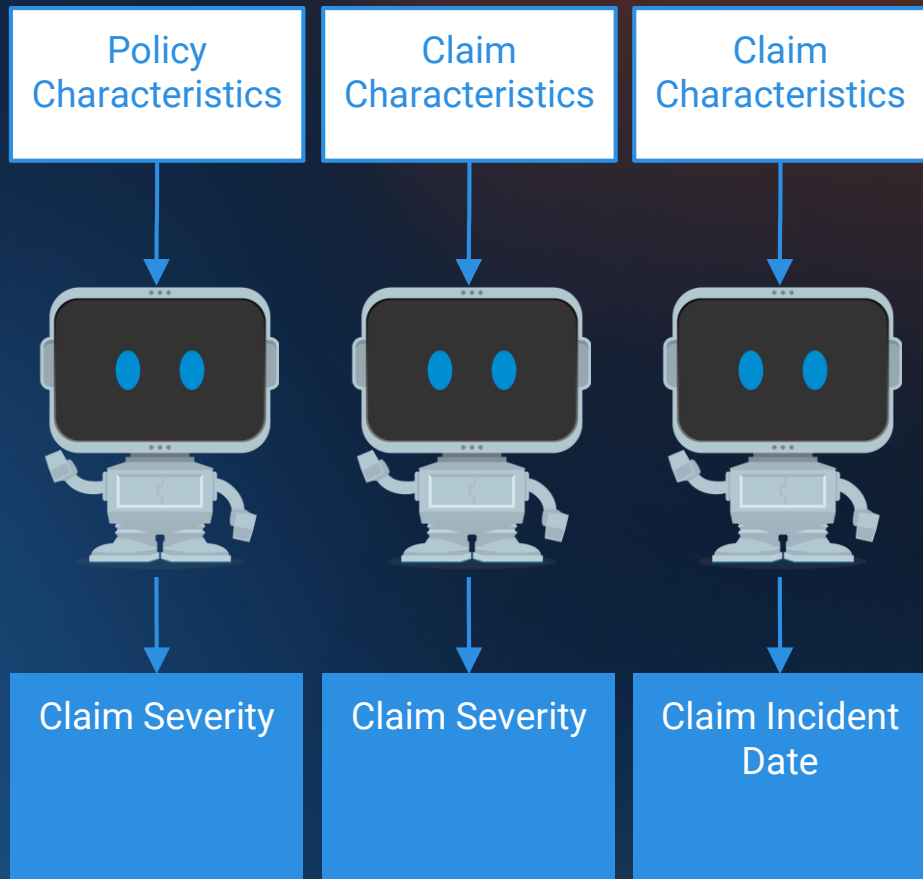
Changes in the nature of claims over time.

Objective: Discover If Claim Severities Are Stable

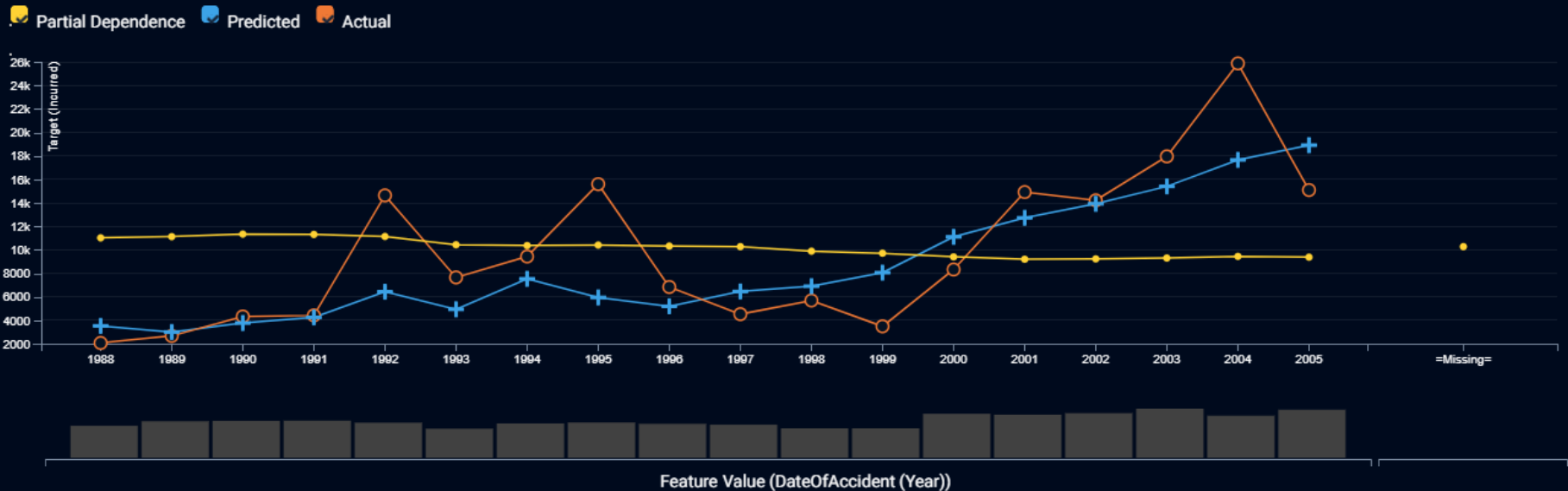
Total severities e.g. superimposed inflation.

Change in mix of claims e.g. more soft tissue injuries.

This can indicate anti-selection.



What Does The Output Look Like?

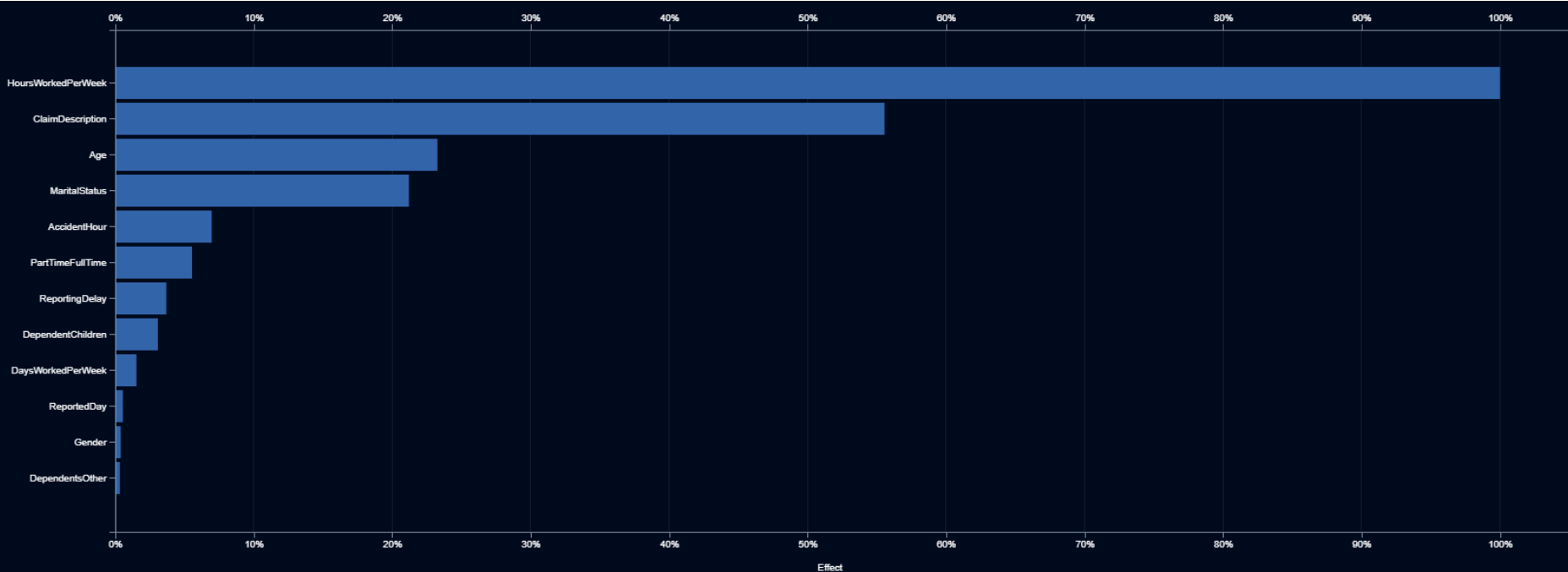


Feature Effects can show the time-related effect on claim severity, after allowing for other factors (such as changes in exposure).

In this case (a workers compensation example), while the claim severity has increased in recent years, this is explained by other factors e.g. wages.



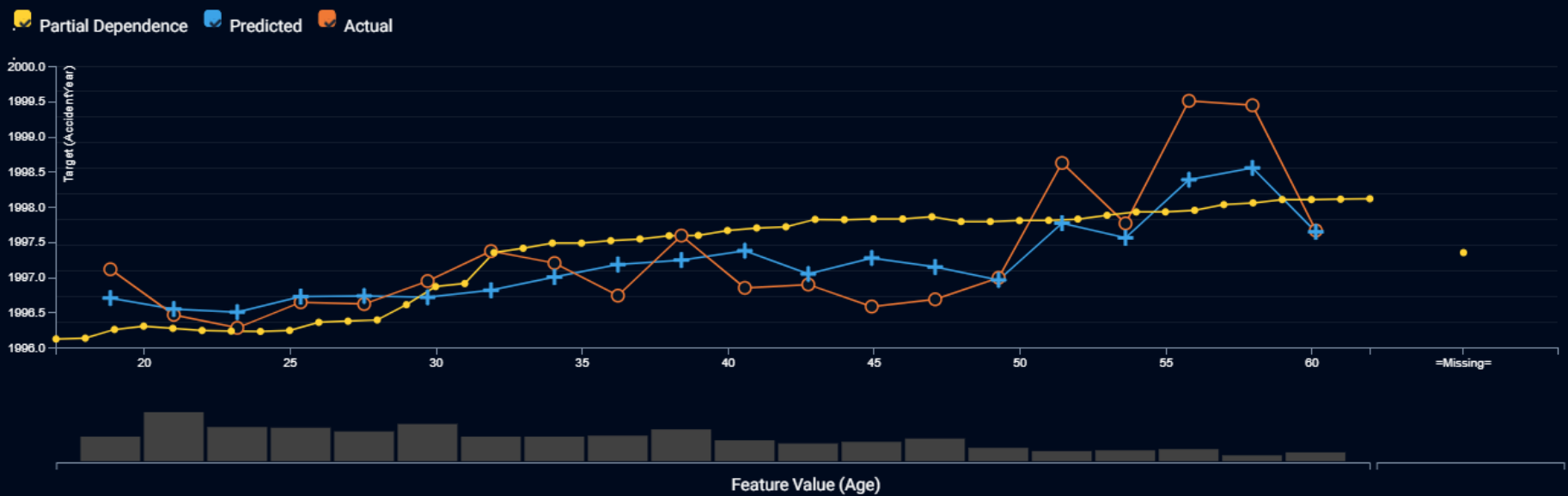
What Does The Output Look Like?



Feature Impact can identify the most important claim factors that have been changing over time. In this case (a workers compensation example) the strongest effect is hours worked per week.



What Does The Output Look Like?



Feature Effects can show the details for the changing claim details.

In this case (a workers compensation example) there are fewer young workers having claims in the latest years.



Step 4: Select Time Period and Inflation Adjustment



Objective: Relevant Historical Period

Long enough that the patterns are
credible.

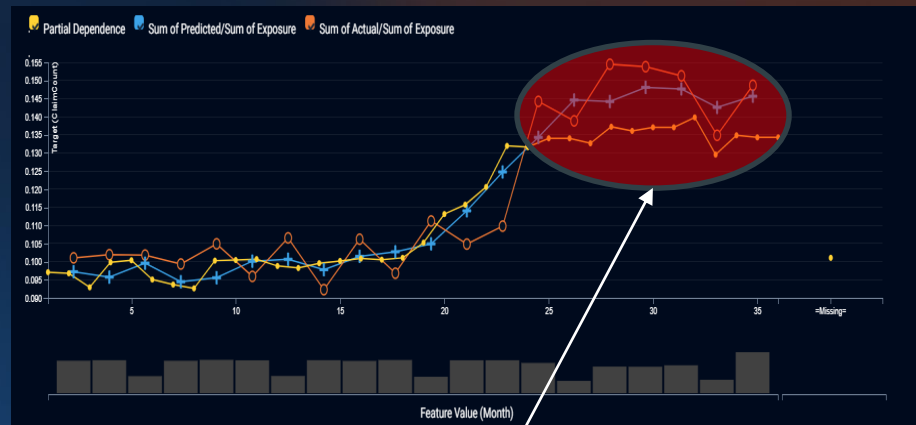
Short enough to be relevant.

Allow for trends e.g. inflation.



What Does This Look Like?

Look for material changes in the key claims cost drivers and preferably only use data after those changes have stabilised.

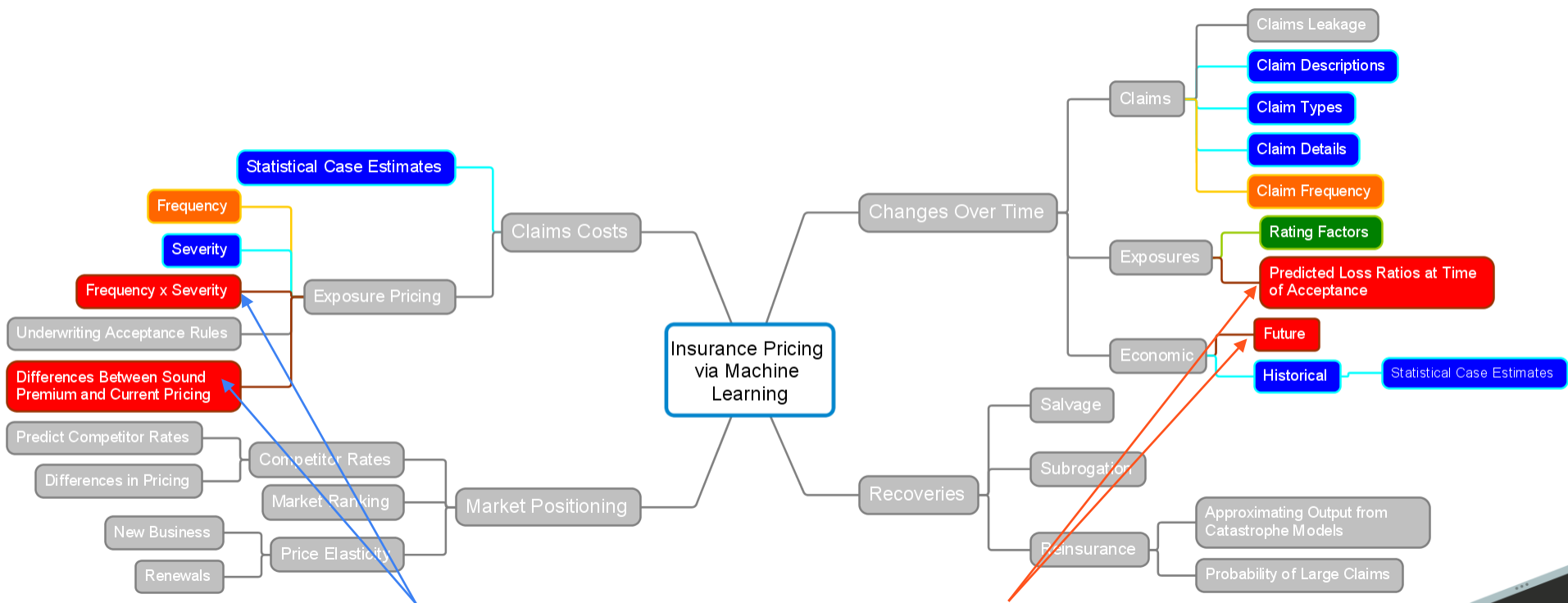


In the example above, only the past 12 months of claims will be relevant.

Step 5: Technical Exposure Pricing



Step 5: Technical Pricing



Technical Pricing +
Identify current mispricing

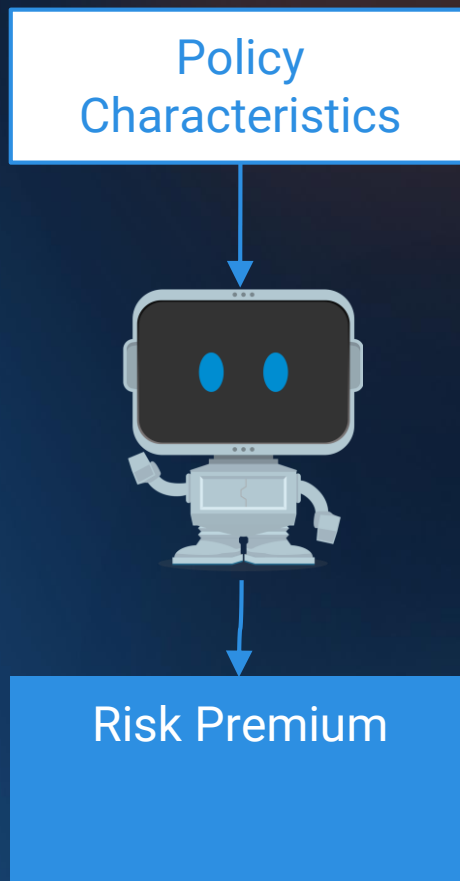
Understand time based trends so that you
can allow for future inflation

Objective: Estimate The Risk Premium

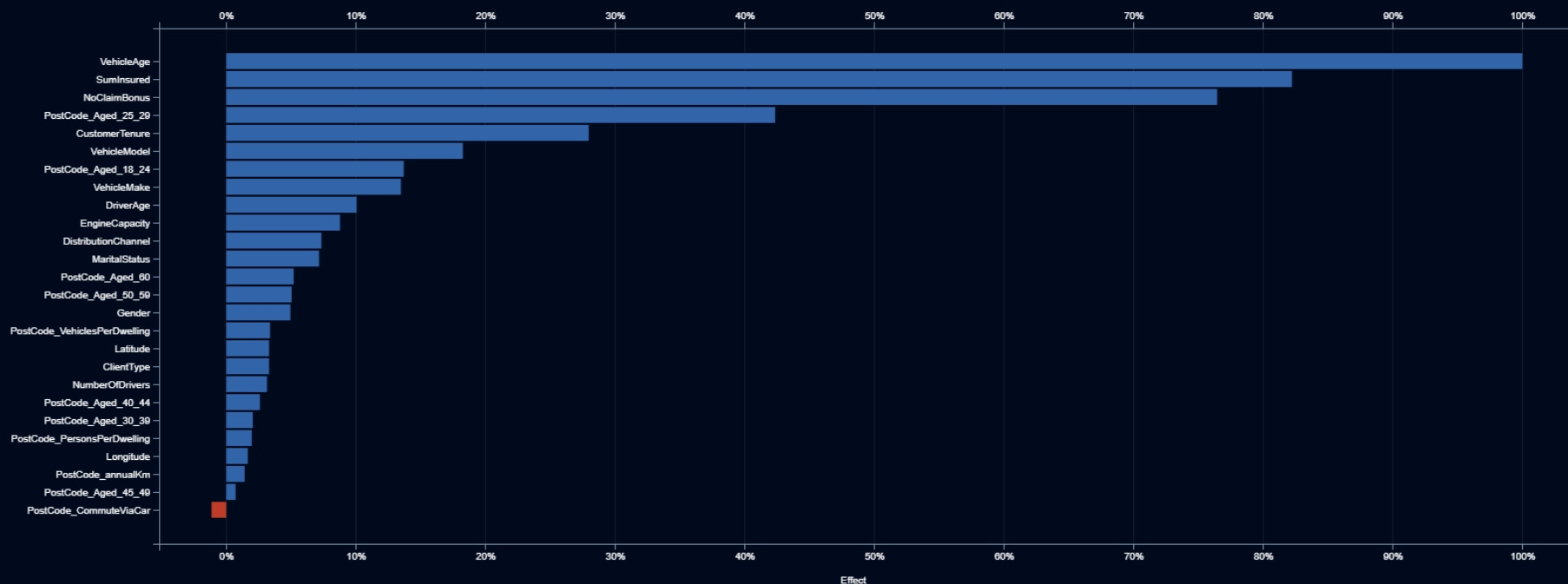
Average risk premium.

Risk relativities.

Allow for trends e.g. inflation.



What Does The Output Look Like?

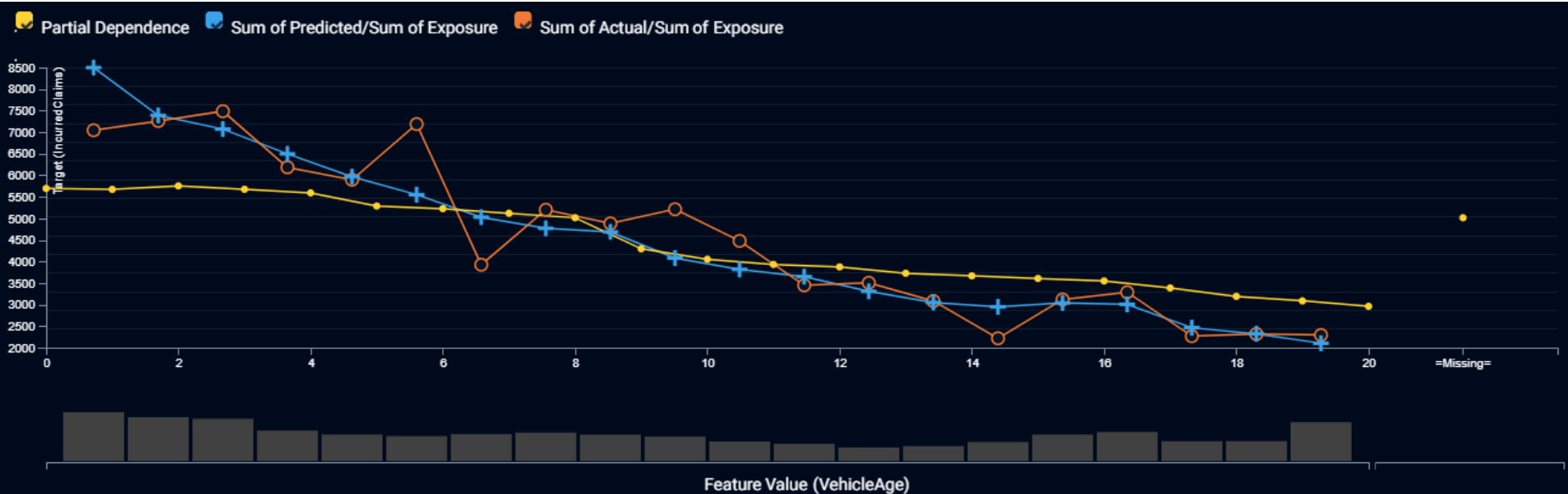


Feature Impact can identify the most important rating factors in your portfolio.

In this case the strongest effect is the vehicle age, closely followed by the sum insured and no claim bonus.



What Does The Output Look Like?



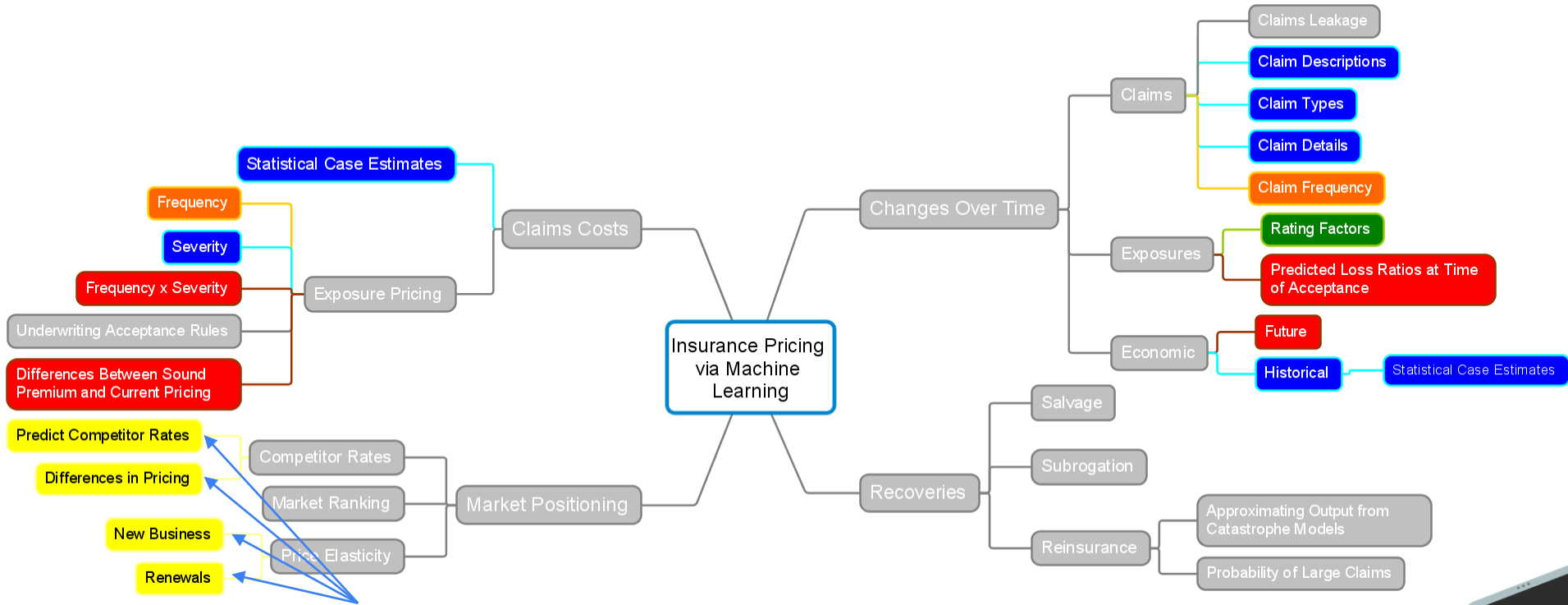
Feature Effects can show the details for the rating factor effects on risk premium. In this case, after allowing for confounding effects, the expected claims cost only decreases once a vehicle is 9 years old.



Step 6: Commercial Pricing



Step 6: Commercial Pricing



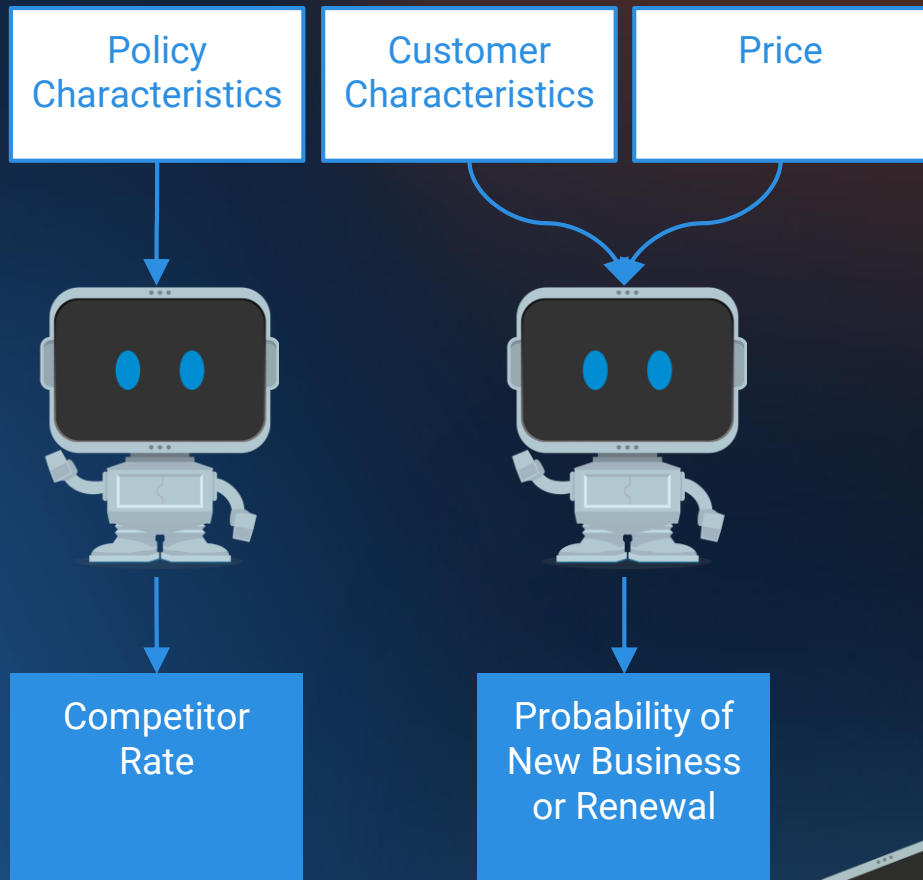
Identify optimal commercial pricing

Objective: Find a Practical Premium Rate That People Will Pay

Don't charge lower than you need to.

Don't risk anti-selection by charging too high.

Can indicate mis-pricing.



What Does This Look Like?

For each customer:

- What are your competitors charging?
- Where do your prices rank in the market?
- Are you charging very different to the market?
- At what price point can you balance profit margin versus volume?



Conclusion



Pricing Analysis is Complex!

But without all this analysis you could reach the wrong conclusions.

For this to be practical, you need to make this **complex and repetitive task** as quick as possible by standardising and **automating** as much as possible.

Human Strengths



- Communication and engagement
- General knowledge and common sense
- Creativity
- Empathy

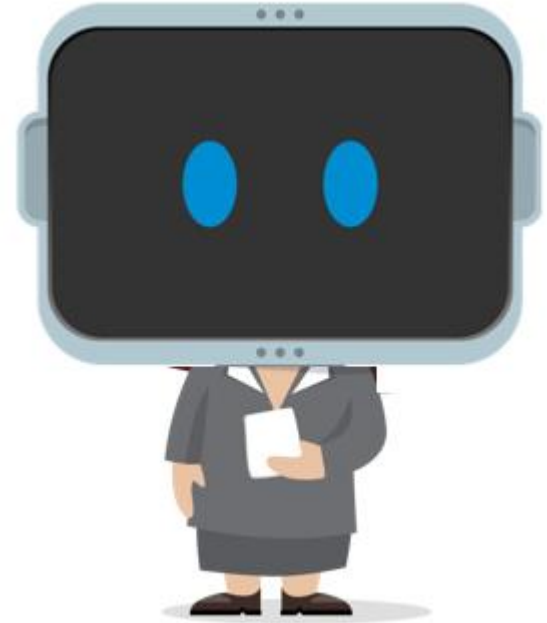
Computer Strengths



- Repetitive tasks
- Mathematics
- Data manipulation
- Parallel processing

Stop Asking Your Actuaries to be Cyborgs

Automate the repetitive and time-consuming tasks and free them up to be expert advisors!





Questions?



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