



A supervision manager has asked you to help in allocating scarce resources and identify which firms their team should focus on. Supervisory resource may be allocated according to the following characteristics:

- Firm size (i.e. the biggest firms need more attention)
- Changing business profile (are firms' data changing substantially year-on-year?)
- Outliers from the norm (when looking at a single reporting period, does a firm deviate significantly from the average?)

Some typical metrics have been provided in the attached data sheets. These include:

- Gross Written Premium (GWP) – total revenue written by an insurer. Equivalent of turnover for a non-insurance firm.
- Net Written Premium (NWP) – GWP less reinsurance.  $NWP / GWP$  will show how much of the firm's risk is being passed on to reinsurers.
- SCR coverage ratio – a measure of whether a firm is meeting its prudential capital requirements. Greater than 100% means the firm is holding enough capital to meet the requirement. The size of the buffer (i.e. surplus over 100%) can be important.
- Gross claims incurred – a large cost to an insurer. Monitoring how these change over time for a firm is vital.
- Net combined ratio –  $(\text{incurred losses plus expenses}) / \text{earned premiums}$ . This is a ratio that can indicate the profitability of a firm. If this is less than 100% it indicates a profit.

### Task I

Using the data provided, analyse using R or Python and produce a short report. Include tables and charts to highlight which firms should receive the most supervisory attention, according to the metrics above.

### Task II

Consider relevant ML techniques to draw out further insights. Present them in your report.



## Notes

More metrics have been provided in the data than are necessary to include. Feel free to utilise these as you wish, but it is not necessary to use all metrics.

The data have been anonymised using a random multiplier. As such, there may be some unexpected patterns in the data.

It can be useful to include multiple metrics on the same chart e.g. net combined ratio on one axis, net written premium on another. Joining of the datasets may be required to achieve this.

Some of the data will contain outliers that may be genuine, but some may be errors in reporting (i.e. numbers that are so different to all other firms they are obviously wrong). Try to distinguish between the two, a separate section highlighting errors in reporting is also useful.

Please follow standard coding practices and push your code to a **private** GitHub repo. Please provide us with the link to your repository before the date set out in the deadline. Ensure that the repo is set to private and provide user nb06 with access to collaborate.

Please consider using notebooks to present your code/analysis. We are interested in seeing your presentation skills as well as your ability to solve problems.

Should you pass this assessment stage, you will be asked to explain sections of your code, as well as your general approach to the analysis.