

Insurance firm analysis report

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Task 1

1. Selecting potential candidates

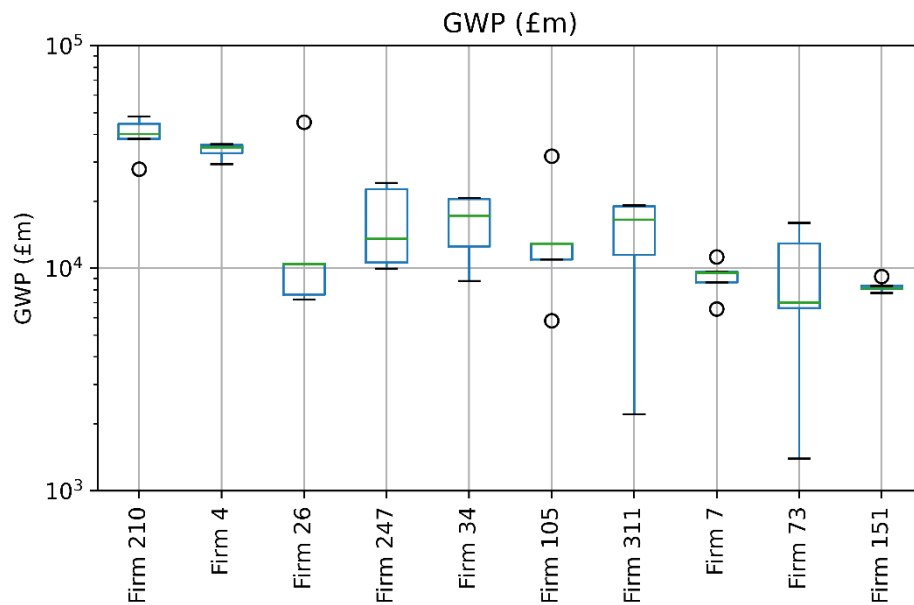


Fig. 1. Gross written premium of the top 10 firms.

As the task is to identify which big firms the team should focus on, I choose gross written premium (GWP) as the primary key performance indicator. Fig. 1 shows the GWP of the top 10 firms. The following analysis will be focused on them.

2. SCR coverage ratio

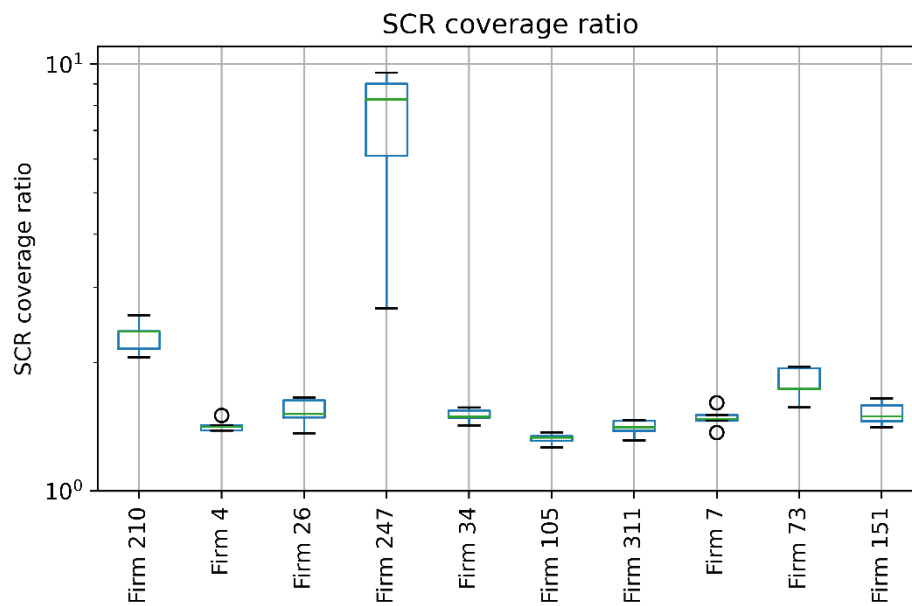


Fig. 2. Solvency capital requirement (SCR) coverage ratio of the 10 firms.

Fig. 2 depicts the solvency capital requirement (SCR) coverage ratio of the firms. It can be seen that all firms have a ratio greater than 1 (100%), which means that they were holding enough capital. In particular, Firm 247 has the highest SCR coverage ratio among the candidates.

3. Net written premium

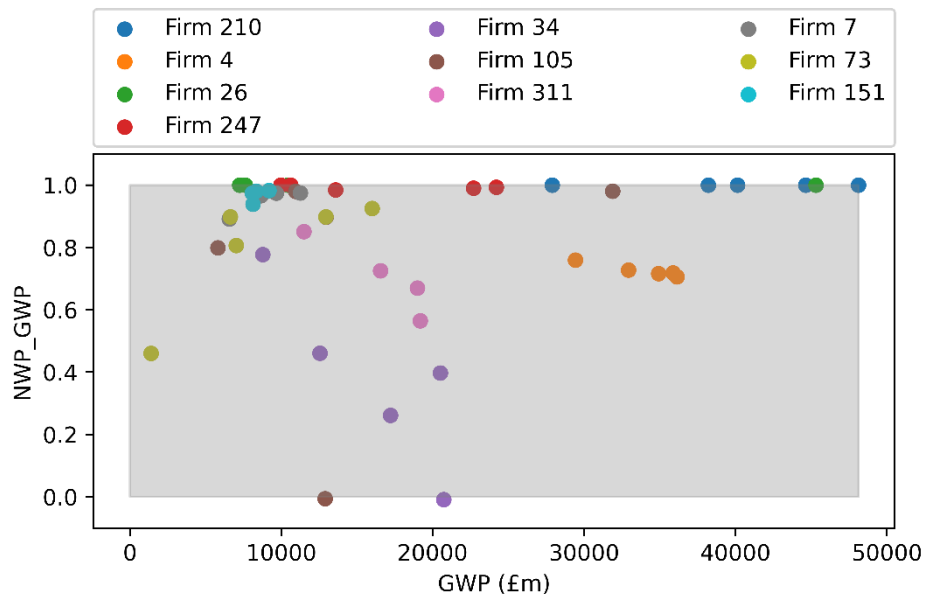


Fig. 3. NWP/GWP vs. GWP of the 10 firms. Grey area means acceptable NWP/GWP values.

Net written premium (NWP) equals GWP minus reinsurance. $NWP/GWP = 1 - \text{reinsurance}/GWP$. Fig. 3 plots the NWP/GWP vs. GWP. An NWP/GWP value close to 1 indicates that the firm have purchased little reinsurance, leaving them at a high-risk position. The risks are summarized in Table 1.

4. Gross claims incurred

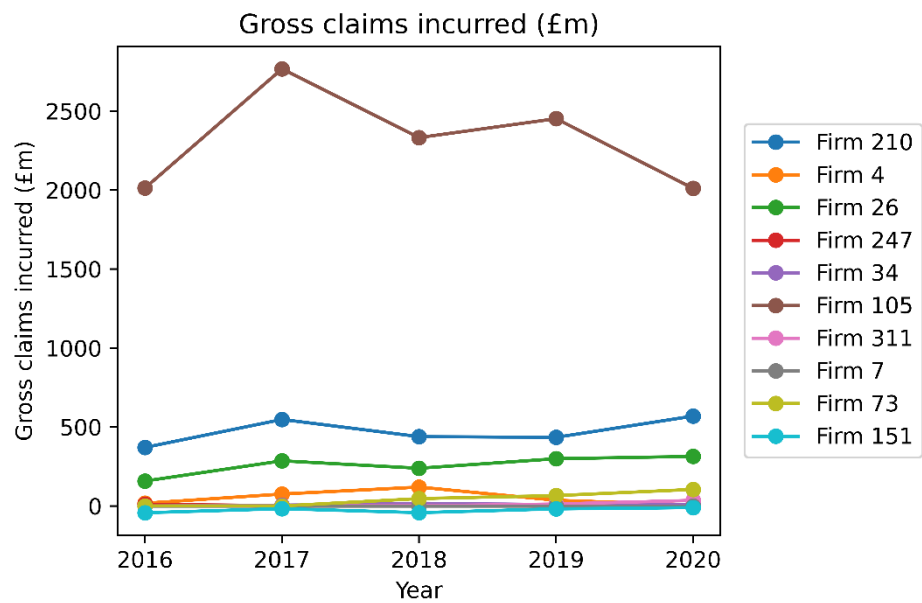


Fig. 4. Gross claims incurred between year 2016 to 2020 of the 10 firms.

Fig. 4 shows the gross claims incurred over years of the 10 firms. It can be seen that all firm have stable gross claims incurred over the five year. Firm 105 has the highest cost on average.

5. Net combined ratio

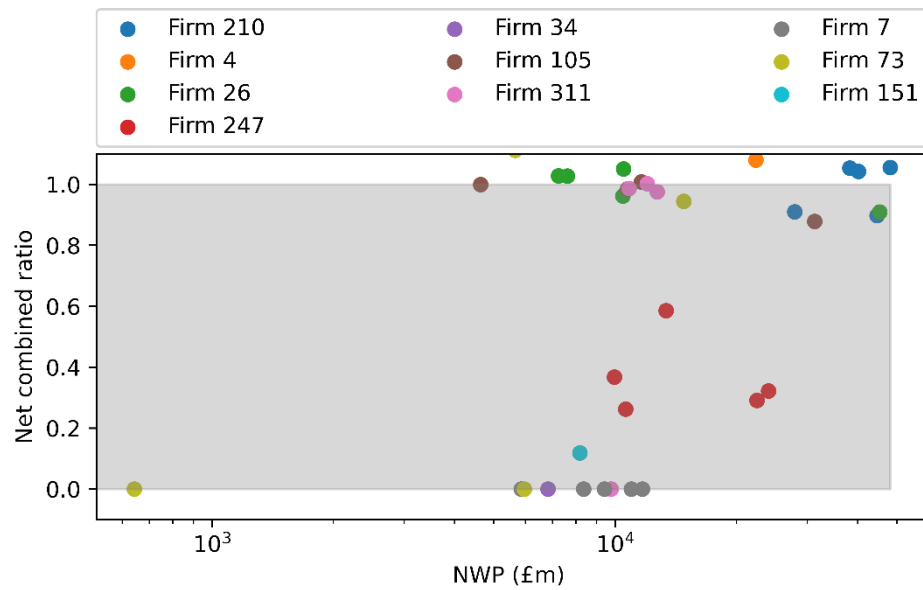


Fig. 5. Net combined ratio vs. NWP of the 10 firms. Grey area means profitability area.

Fig. 5 plots the new combined ratio vs. NWP. Firm 247 outperforms the other candidates.

Table 1. Rating of risk, cost and profitability of the 10 firms.

Firm size	210	4	26	247	34	105	311	7	73	151
Risk	H	M	H	H-	L	M	L	H	M	M
Cost	M	L	M	L	L	H	L	X	M	X
Profitability	B	B	B	G	B	M	M	X	B	X

H – High, M – Medium, L – Low, B – Bad, G – Good, X – wrong data

Table 1 summarizes the ratings of the 10 firms in terms of risk, annual cost and profitability. Taking all the factors into account, the best candidates are Firm 247, 311 and 105.

Task 2

NWP/GWP and net combined ratio values should be within 0 and 1. I used **anomaly detection technique** to check the outliers in the data. The algorithm I used was **Isolation Forest**.

After performing anomaly detection, 24 firms are filtered out. The top 10 firms are shown in Fig. 6. It can be seen that Firm 247, 105 and 311 are filtered out.

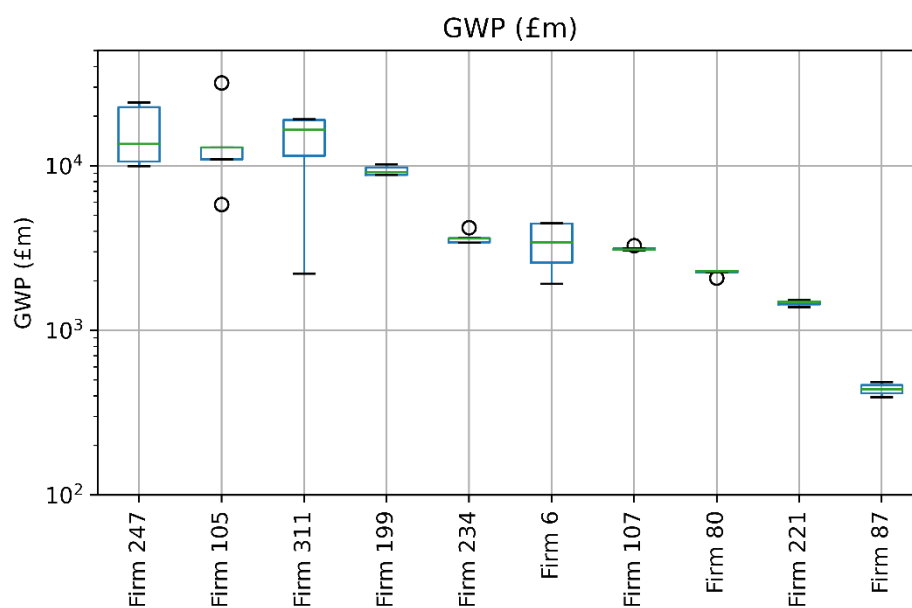


Fig. 6. Gross written premium of the top 10 firms.

To do further analysis, **Decision Tree Classifier** could be used to give ratings to each value.