**BANK OF ENGLAND CASE STUDY**

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?)

**Metrics given in the column:**

NWP (£m) , EoF for SCR (£m) , SCR coverage ratio , GWP (£m) , Total assets (£m) , Total liabilities (£m) , Excess of assets over liabilities (£m) [= equity] Net combined ratio , Pure net claims ratio , Total liabilities (£m) , Total assets (£m) , GWP (£m) , SCR (£m).

The data of above metrics are spread over 5 years from 2016 to 2020.

**Data Cleaning.**

For achieving the objectives, I narrowed down to below 5 metrics:

1. NWP (£m) - Net premiums written is the sum of premiums written by an insurance company over the course of a period, minus premiums ceded to reinsurance companies, plus any reinsurance assumed. **Therefore, higher the better.**
2. SCR (£m) - A solvency capital requirement (SCR) is the total amount of funds that insurance and reinsurance companies in the European Union (EU) are required to hold. **Therefore, higher the better.**
3. Excess of assets over liabilities (£m) [= equity] – This is the worth of assets in excess over the liabilities. **Therefore, higher the better.**
4. Pure net claims ratio - The net claims ratio expresses claims net of recoveries from reinsurers as a percentage of premiums net of premiums ceded to reinsurance. **Therefore, lower the better.**
5. Net combined ratio - The combined ratio is essentially calculated by adding the loss ratio and expense ratio. The lower the ratio, the more profitable the insurance company and vice versa. **Therefore, lower the better.**

These above metrics over 5 years from 2016 to 2020 I have considered for answering the question on the basis of three objectives mentioned above.

First I removed the rows containing all zero’s which were 2% of data as it would add no value to my research and it had effect on my accuracy.

After that I removed the rows which contains zero’s in last 3 years over all metrics which were 4% of data, as I just want to focus on the firms which are doing profitable business which are healthy, have potential to grow and have upwards trend.

**Distribution of Data.**

* NWP
* SCR
* Equity
* Net Claim Ratio
* Net Combined Ratio

**Data Analysis**

For analysis further for finding the firm size, I have considered metrics based on profitability, growth, heathy business and equity and observed the data over the 5 years of these metrics.

I found the weighted average of the metrics as below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5% | 5% | 20% | 30% | 40% |
| Year 2016 | Year 2017 | Year 2018 | Year 2019 | Year 2020 |

and found CAGR over the 5 years for finding the year-on-year growth. I have given more weightage to recent years as past experience matters to me but recent matters more, as I have scarcity of resources, I narrowed it. After that I assigned ranks to the according to the weighted average of the metrics and CAGR of 5 years and deduced a final rank of that metric. I applied same method to all 5 metrics.

After that I deduced a final rank on the basis of final ranks which were the weighted average of final metrics rank as shown below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 20% | 15% | 20% | 15% | 30% |
| NWP | SCR | Equity | Net Claim ratio | Net Combined Ratio |

and given priority on basis of final rank which helped me to find out on what firms the resources should be assigned.

I could find mostly 3 outliers which are Firm 28, Firm 70 and Firm 88 as these are the values which deviate most and were affecting my results in summary.

**OUTPUT**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | NWP(Higher the better) | SCR(Higher the better) | Equity(Higher the better) | NClaimR(Lower the better) | NCR(Lower the better) | Count |
| Priority 1 | 1367.6 | 745.9 | 1258.2 | -62.7 | -79.4 | 30 |
| Priority 2 | 1265.1 | 447.2 | 447.2 | 0.1 | 0.3 | 117 |
| Priority 3 | 455.0 | 289.7 | 506.2 | 0.9 | 1.5 | 101 |
| Priority 4 | 31.8 | 23.0 | 38.6 | 10.3 | 21.4 | 62 |

Here we can see I have given priority 1 to top 30 firms which I deduced from my analysis which are better in each and every aspect. You can have a look at the chart below.

**Summary**

As you can have look at the excel, I have divided the firms in 4 priorities on basis of that supervision manager can assign the resources to particular firms on overall criteria.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| *Regression Statistics* |  |  |  |  |  |  |  |  |
| Multiple R | 1 |  |  |  |  |  |  |  |
| R Square | 1 |  |  |  |  |  |  |  |
| Adjusted R Square | 1 |  |  |  |  |  |  |  |
| Standard Error | 2.02E-14 |  |  |  |  |  |  |  |
| Observations | 313 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |  |  |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |  |  |  |
| Regression | 5 | 732399.5461 | 146479.9 | 3.6E+32 | 0 |  |  |  |
| Residual | 307 | 1.24742E-25 | 4.06E-28 |  |  |  |  |  |
| Total | 312 | 732399.5461 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | -7.1E-14 | 3.72682E-15 | -19.0657 | 5.17E-54 | -7.8E-14 | -6.4E-14 | -7.8E-14 | -6.4E-14 |
| NWP | 0.2 | 2.42288E-17 | 8.25E+15 | 0 | 0.2 | 0.2 | 0.2 | 0.2 |
| SCR | 0.15 | 3.97167E-17 | 3.78E+15 | 0 | 0.15 | 0.15 | 0.15 | 0.15 |
| Equity | 0.2 | 3.72231E-17 | 5.37E+15 | 0 | 0.2 | 0.2 | 0.2 | 0.2 |
| Net Claim Ratio | 0.15 | 3.20296E-17 | 4.68E+15 | 0 | 0.15 | 0.15 | 0.15 | 0.15 |
| Net Combined Ratio | 0.3 | 3.28488E-17 | 9.13E+15 | 0 | 0.3 | 0.3 | 0.3 | 0.3 |

**Assumptions**

While calculating year on year growth over the 5 years when there was 0 in year 2016 and year 2020 , I have taken growth to be 0% and when there was 0 in 2016 and some value in 2020 I have taken growth to be 100%.