NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Car Accident Insurance

Edit Done By Seminar Group 7 Team 8

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Introduction

A Singapore-based insurance company has tasked the team of consultants with researching relevant criteria that they can implement. The company wishes to implement more stringent criteria for car accident insurance to improve profitability. The company collected data from all accident claims made by policyholders arising from accidents that happened in Singapore, during the last financial year.

How companies price their policies is a well-kept secret. The team researched the industry trend to get a better understanding of how some of these standards are applied to car accident insurance premiums.

Some notable inclusions include:
- Number of previous claims
- Number of previous tickets
- Gender of Driver
- Age of Driver

Some other inclusions would include:
- Make and model of the car
- Colour of car

Assumptions

- Industry standards refer to both the likelihood of getting into an accident and the likelihood of getting into more severe accidents
- Each row of data represents one existing policyholder's accident claim
- The magnitude of accident costs represents the extent or severity of the accident insured

Gender

Industry Standard: Males have a higher likelihood of getting into an accident as compared to Females.

Industry Standard: Males have a higher likelihood of getting into more severe accidents as compared to Females

Industry standard assumes that male drivers are more reckless. This results in a higher likelihood of getting into accidents as well as higher likelihood of getting into more severe accidents as compared to female drivers.

The data shows that a larger distribution of males, as compared to females, get into accidents. We can conclude that males are more likely to get into accidents as compared to females. This supports the industry standard, which assumes a higher accident count for males as compared to females.

The Mean Accident Cost by Gender
F 2885.0
M 2873.0

Our data shows that females have a higher mean of accident cost as compared to males. We can conclude that females are more likely to get into more severe accidents as compared to males. This contradicts industry standards, which assume that there should be a higher mean of accident cost for males as compared to females.

Male drivers do have a higher likelihood of getting into accidents as compared to female drivers. However, female drivers have a higher likelihood of getting into more severe accidents as compared to male drivers.

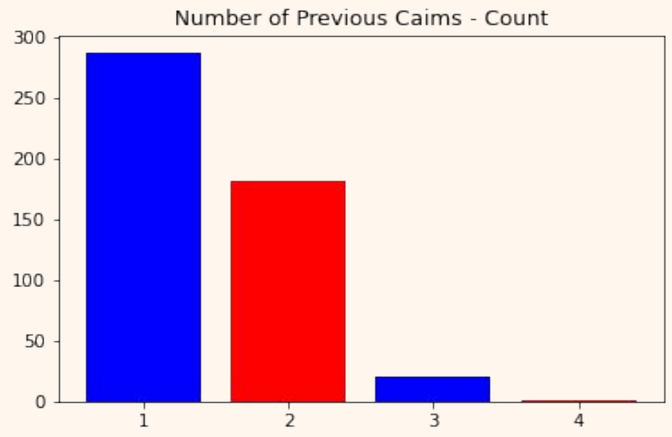
Number of Previous Claims

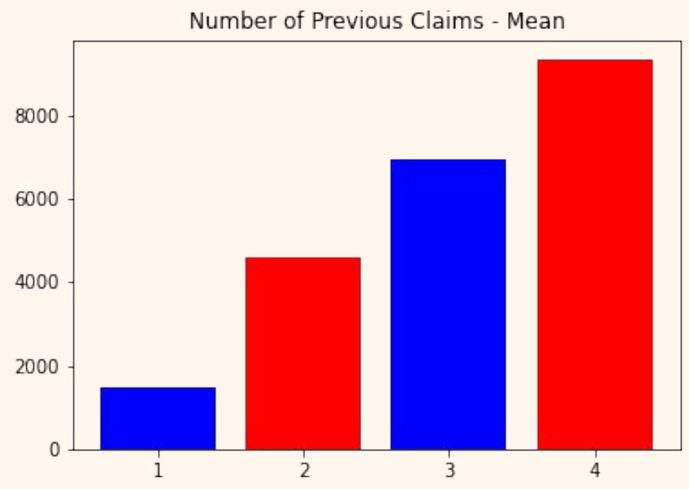
Industry Standard: The higher the number of previous claims, the higher the likelihood of getting into an accident

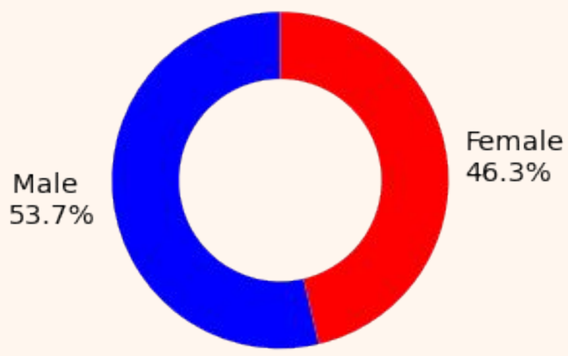
The industry standard assumes that an increase in the number of previous claims suggests that the individual is more likely to be a reckless driver, resulting in a similar increase in the likelihood of getting into an accident.

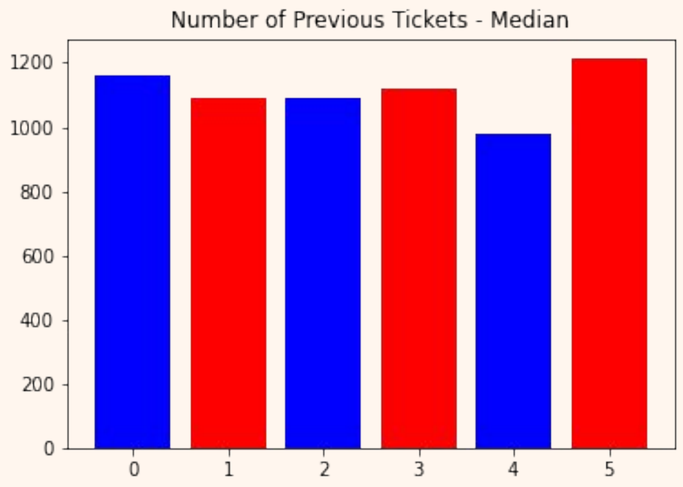
The data shows a higher occurrence of accidents when policyholders have a single previous claim as compared to when they have multiple previous claims. This contradicts the industry standard, which assumes that an increase in the number of previous claims would result in a similar increase in the number of accident cases.

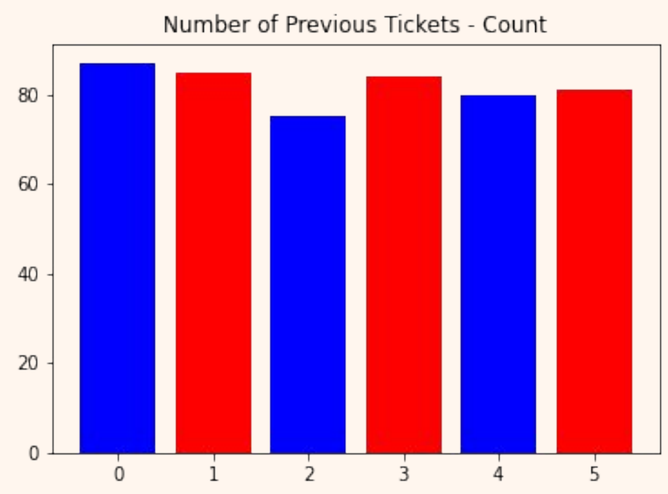
From our data, we can conclude that there is no direct relationship between the number of previous claims and the likelihood of accidents occurring.











Number of Previous Tickets

Industry Standard: The higher the number of previous tickets, the higher the likelihood of getting into an accident

Industry Standard: The higher the number of previous tickets, the higher the likelihood of getting into more severe accidents

Industry standard assumes that drivers with more tickets previously issued, as a result of driving offences, would increase the probability that the individual is a reckless driver, increasing the likelihood of getting into an accident and the likelihood of getting into more severe accidents.

The data show a flat distribution of the number of accidents between policyholders who have varying numbers of previous tickets. This contradicts the industry standard, which assumes that there should be an increase in the number of accident cases as a result of an increase in the number of previous tickets issued.

The data also show similar means of accident costs between policyholders who have a varying number of previous tickets. This contradicts the industry standard, which assumes that there should be an increase in the mean accident costs when there is an increase in the number of previous tickets issued.

However, our data shows that there is no relationship between the number of previous tickets issued and the likelihood of getting into an accident and the likelihood of getting into a more severe accident.

The company could still consider the implementation of this risk factor during premium calculation for new policyholders despite the lack of data supporting this course of action. It may make business sense to include such a factor as a precautionary measure to warn policyholders against driving recklessly, which could increase their risks of getting into an accident, with the threat of increased premiums.

There could also be issues with the dataset collected. The dataset could be limited in nature, resulting in inaccurate findings. View Limitation Section.

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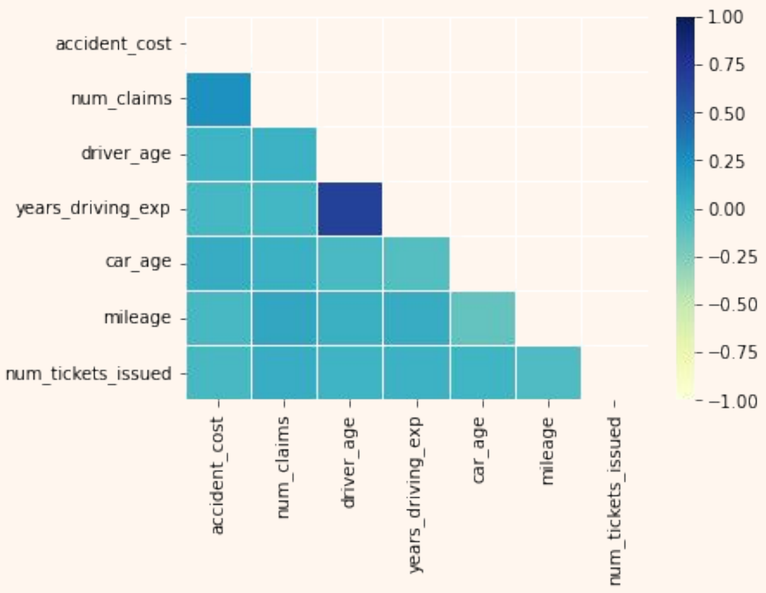
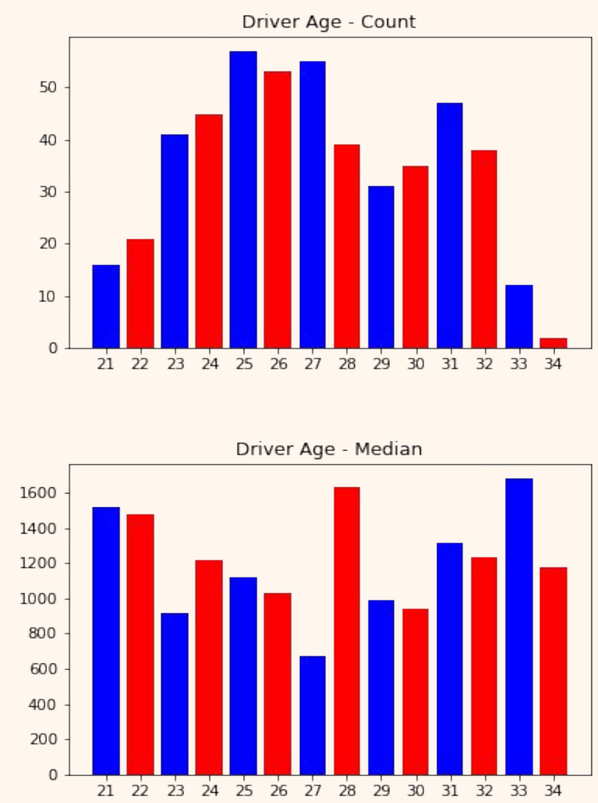
Driver Age

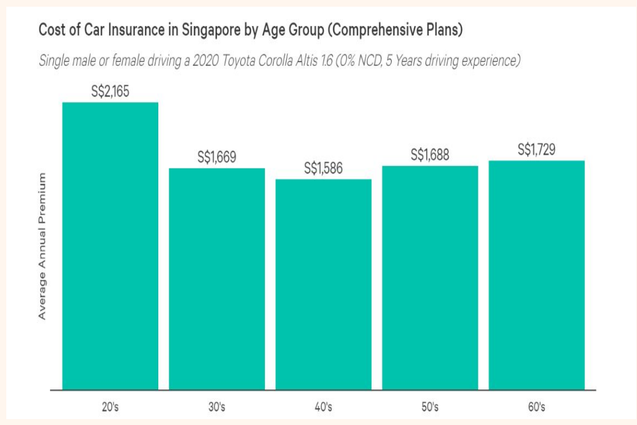


The heatmap shows a strong correlation between the driver's age and years of driving experience. For the purpose of this analysis, we will assume that the differences between the driver's age and years of driving experience are negligible and hence the same. The older the policyholder, the more years of driving experience the policyholder has.

This might not necessarily be true in real life, as there is a possibility that policyholders only get their driving licences in their 40s and thus have less than 2 years of driving experience.

To simplify our assumptions and analysis, it is assumed that the older the policyholder, the more years of driving experience the policyholder has.





Industry Standard: The younger the driver, the higher the likelihood of getting into an accident

Industry Standard: The younger the driver, the higher the likelihood of getting into more severe accidents

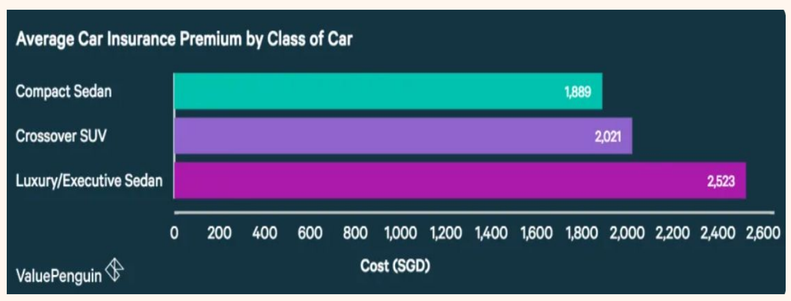
The industry standard assumes that younger drivers, who would have fewer years of driving experience, would have less refined driving skills and thus result in an increase in the likelihood of getting into an accident as well as an increase in the likelihood of getting into more severe accidents.

There seems to be two occurrences in the dataset where it resembles a bimodal distribution, where data are more likely to occur in two places. However, there is no clear pattern between age and the likelihood of getting into an accident. The data also does not show a clear relationship between age and the likelihood of getting into more severe accidents.

Upon further research, there seems to be a relationship between driver's age and the likelihood of getting into an accident or more severe accidents. Car accident insurers will increase premiums for individuals in certain categories who they deem more likely to be involved in accidents or severe accidents.

Car insurance premiums are at their highest when policyholders are in their 20s and decrease as they age through their 30s and 40s. This could be due to young drivers being relatively inexperienced and reckless. There also seems to be an increase in premium prices when policyholders reach their 50s. This could be due to their deteriorating vision and their slowing reaction speed. This would result in insurers increasing insurance premiums as they would be concerned with individuals getting into more accidents or accidents of greater severity in their accident-prone ages of the early 20s and 50s onward.

Make and Model of Car

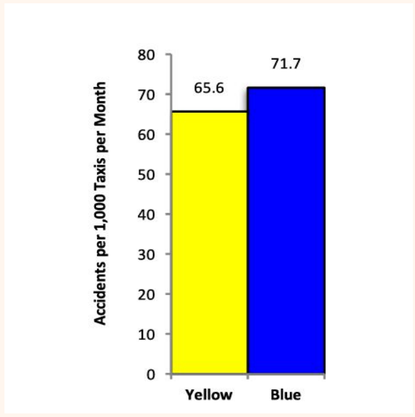


From our research, there seems to be a difference in premiums for different types of vehicles. Car accident insurers will increase premiums for individuals in certain categories that they deem more likely to cause accidents or severe accidents.

Annual car insurance premium for luxury or executive sedans is the highest, with an average cost of $2523, compared to crossover SUVs and compact sedans. Crossover SUVs have a higher annual insurance premium of $2021 compared to compact sedans at $1889.

This could be related to the cost of car parts. Luxury sedans usually have more expensive car parts, resulting in higher repair costs, hence it would be more risky to insure and thus command higher premiums.

Colour of Car



From our research, yellow taxis had fewer accidents than blue taxis.

This is because yellow taxis are more noticeable than blue taxis, especially when in front of another vehicle and street lighting. Therefore, other drivers can better avoid hitting them, thereby directly reducing the accident rate.

Car accident insurers could increase premiums for cars that have duller or more common colours like black or beige, which do not stand out as much compared to other cars.

Limitations

The data collected only looks at the company level. The number of previous tickets includes offences which do not result in demerit points such as stopping in yellow box or making an unauthorised U-turn.

If the sample size was on a larger scale and a different classification, similar to what insurance companies are currently using, such as the number of demerit points, were used for the number of previous tickets, it could have resulted in a different conclusion.

Conclusion

Low Likelihood High Severity $$$	**High Likelihood High Severity $$$$**
Low Likelihood Low Severity $	**High Likelihood Low Severity $$**

The company could use a framework to estimate the additional premiums to charge an individual to be insured for car accidents.

An increase in the likelihood of policyholders getting into more severe accidents will result in the company bearing more risks than an increase in the likelihood of the occurrence of an accident, ceteris paribus.

The company can rank policyholders based on factors such as age, gender, and number of previous claims made. With this, the company will be able to calculate the total additional premiums, on top of the basic rate, that policyholders need to pay due to the increase in risks borne by the company.

Using this framework, the company will be able to implement these relevant criteria into the calculation of car accident insurance premiums. This will allow the company to enforce stricter criteria for car accident insurance policies. This helps increase overall profitability by lowering the base price to attract more customers and increasing the total price to reflect the greater risks borne by the company.

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