



INSURANCE CASE STUDY

GOALS



How can we retain existing
policy-holders while
optimizing cost?



Which other market
segments should be our new
target?

DATASET

01

DATA ANALYSIS

02

DATA MODELLING

03

ACTIONABLES

04

DATASET



CHARGES

Amount billed by hospital to insurance company



AGE

Age of the individual



BMI

Height/weight of the individual



CHILDREN

Number of children the individual has



SEX

Male/female



REGION

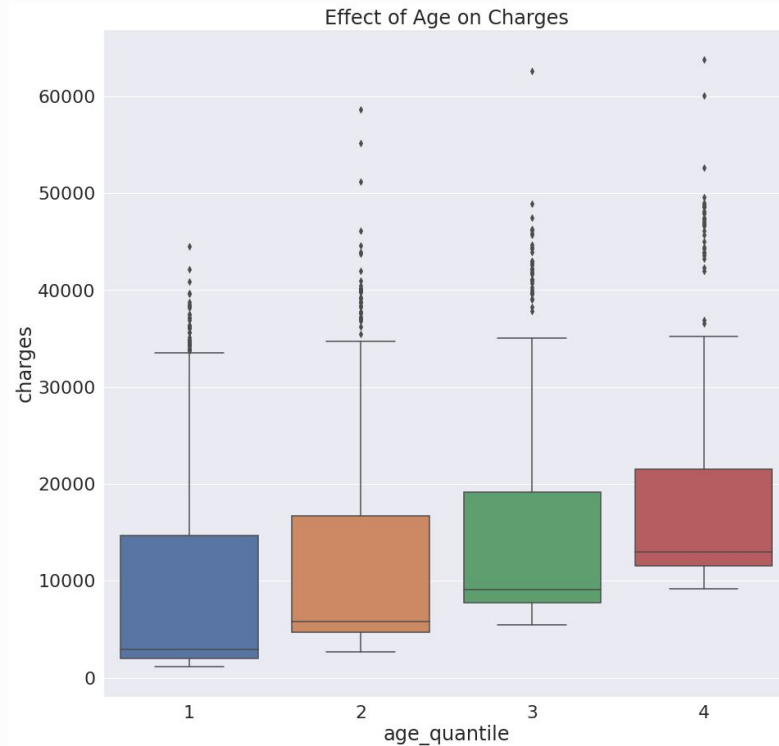
Northwest, Southwest, Northeast, Southeast



SMOKER

Smoker/non-smoker

ANALYSIS

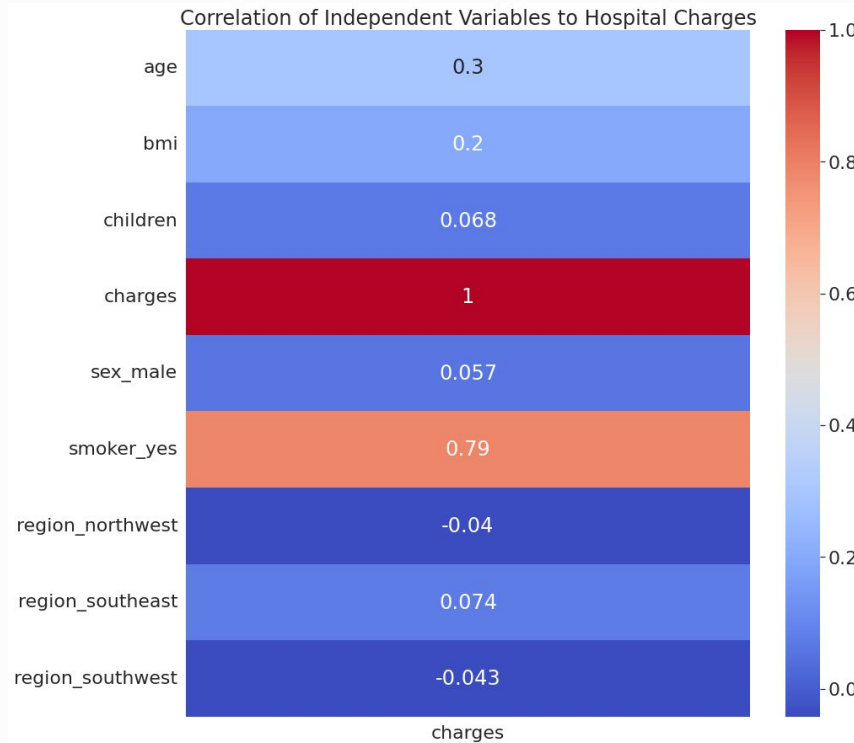


Mean is generally higher with age

There are many outliers in each age quantile

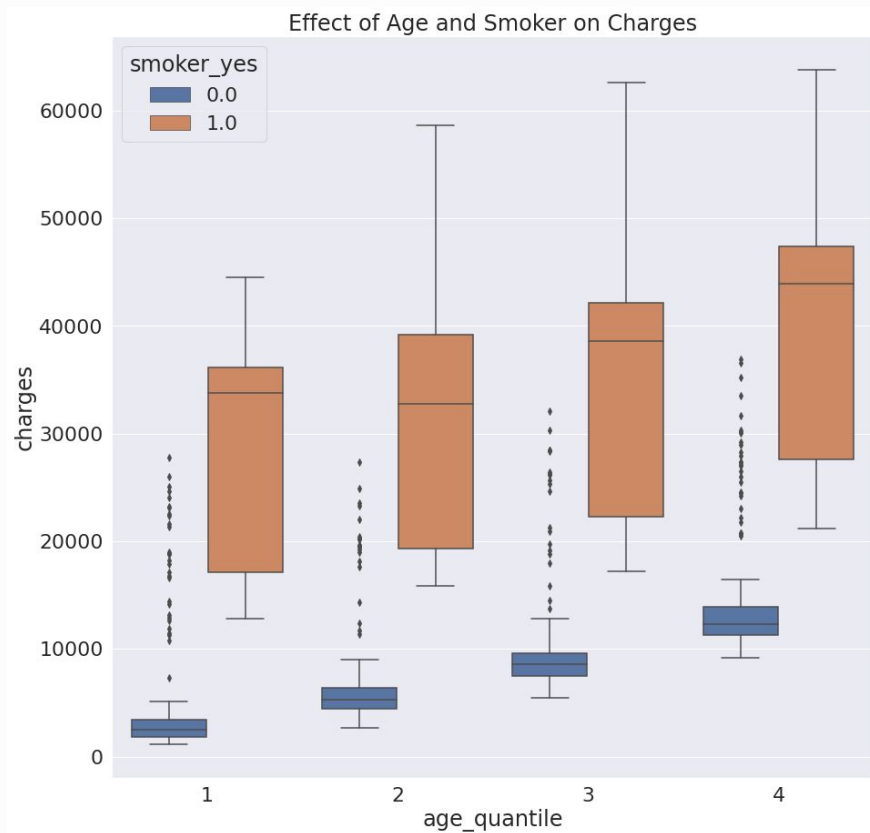
This suggests that there are other factors affecting hospital charges

TOP 3 CORRELATION



1. Smoking (0.79)
2. Age (0.3)
3. BMI (0.2)

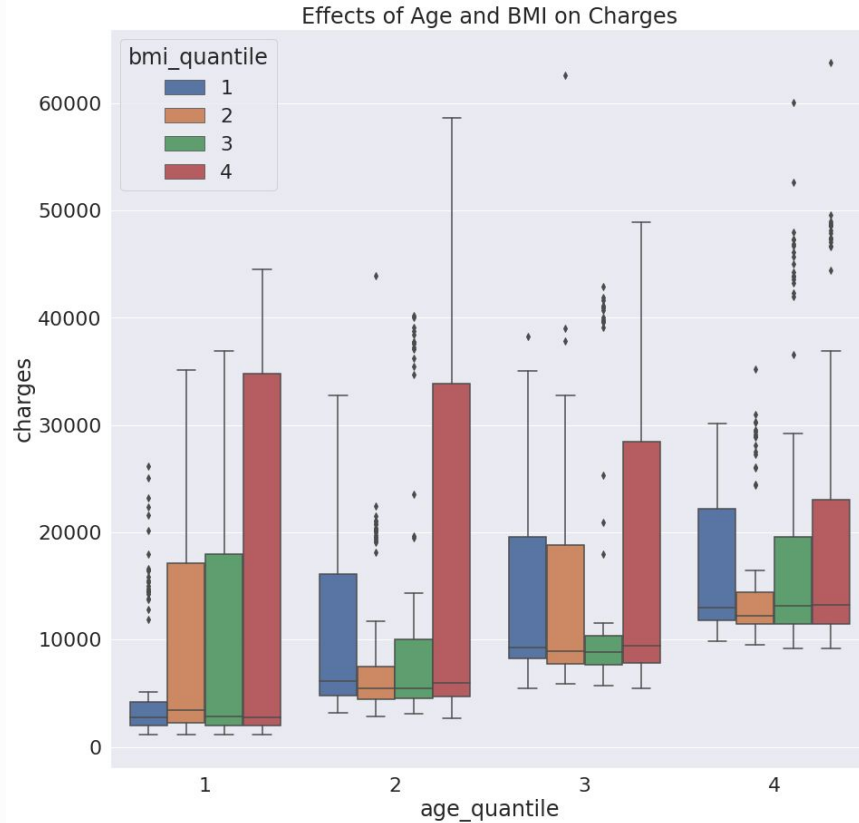
ANALYSIS



Mean charges for smokers are much higher

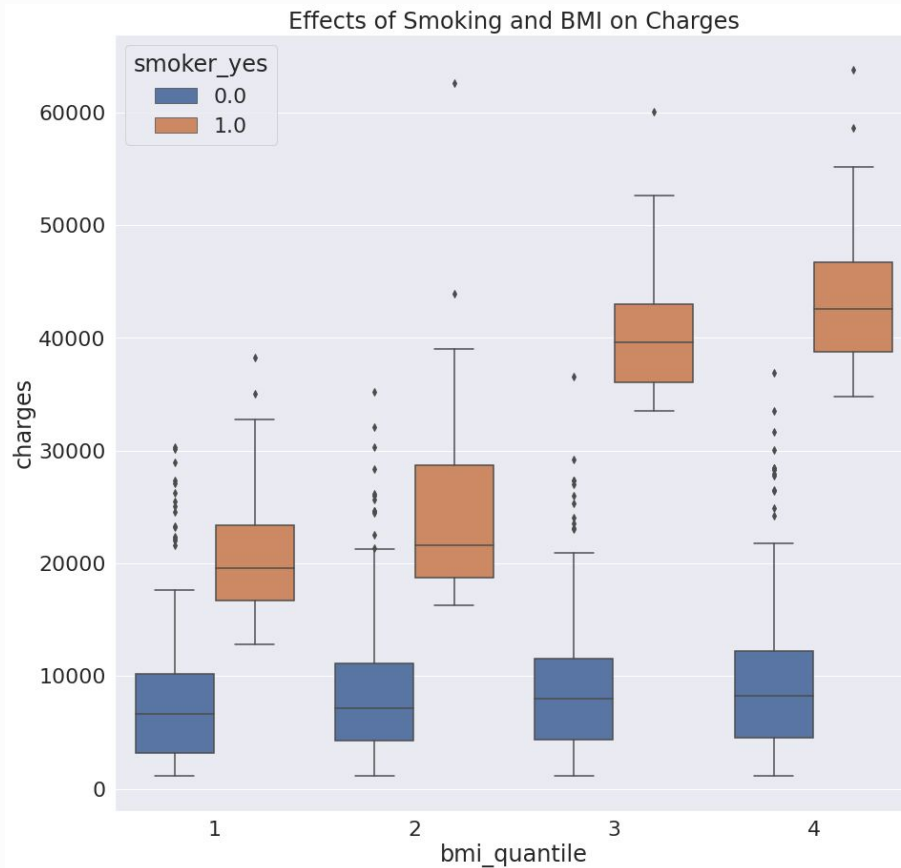
Range of charges wider for smokers

ANALYSIS



We see most significant impact on charges for those with higher BMI, especially in the 4th quartile

ANALYSIS



For non-smokers, the charges do not differ much across BMI

However, when the individual smokes, the hospital charges increases significantly if he/she has a high BMI

WHERE SHOULD OUR RETENTION BUDGET GO TO?



AGE

Age of the individual



BMI

Height/weight of the individual



CHILDREN

Number of children the individual has



SEX

Male/female



REGION

Northwest, Southwest, Northeast, Southeast



SMOKER

Smoker/non-smoker

WHICH NEW MARKET SEGMENTS SHOULD WE TARGET?



**30 YEARS OLD
BMI:20
SMOKER**



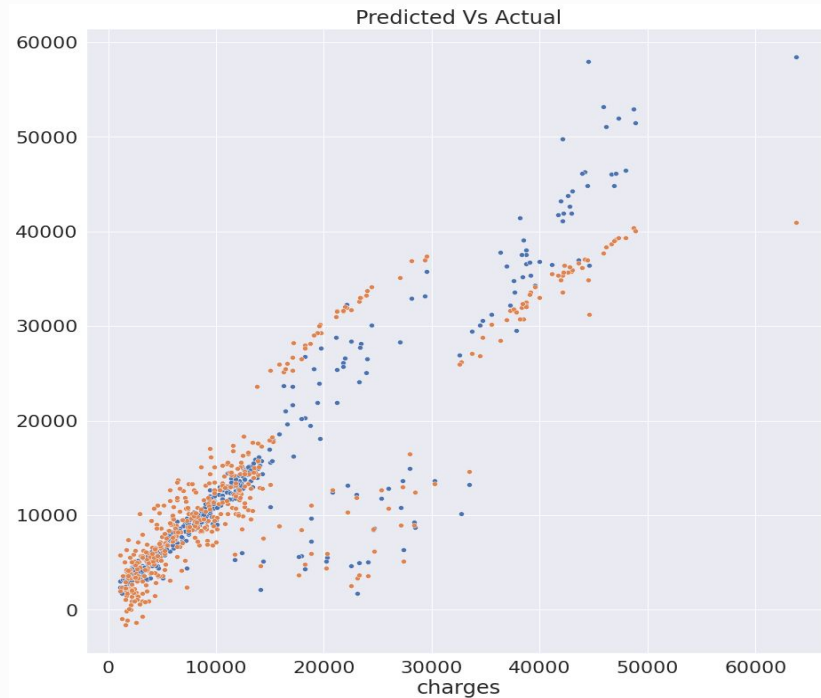
**70 YEARS OLD
BMI:20
NON-SMOKER**



**30 YEARS OLD
BMI:35
NON-SMOKER**

MODELING

MODEL PREDICTION



TRAIN SCORE

0.84

TEST SCORE

0.85

TOP FACTORS

- BMI AND SMOKING
- SMOKER^2
- AGE^2

CV SCORE

0.82

PREDICTING PREMIUMS



30 YEARS OLD
BMI:20
NON-SMOKER
\$4,230



30 YEAR OLD
BMI:20
SMOKER
\$13,125

3.1x



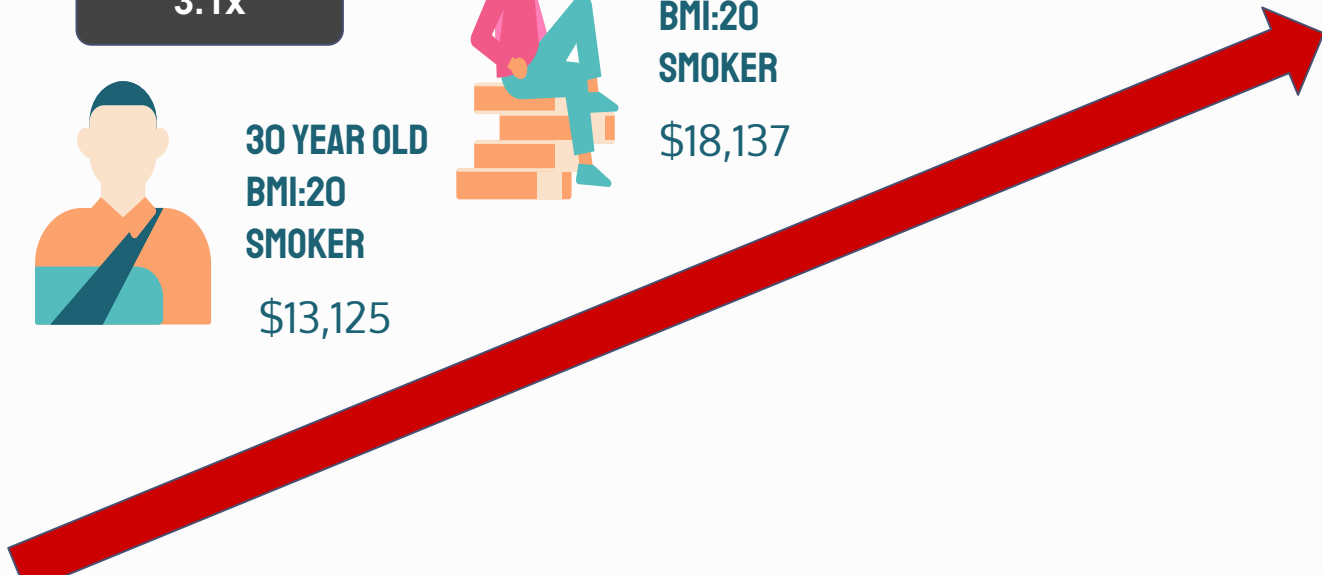
50 YEAR OLD
BMI:20
SMOKER
\$18,137

4.3x

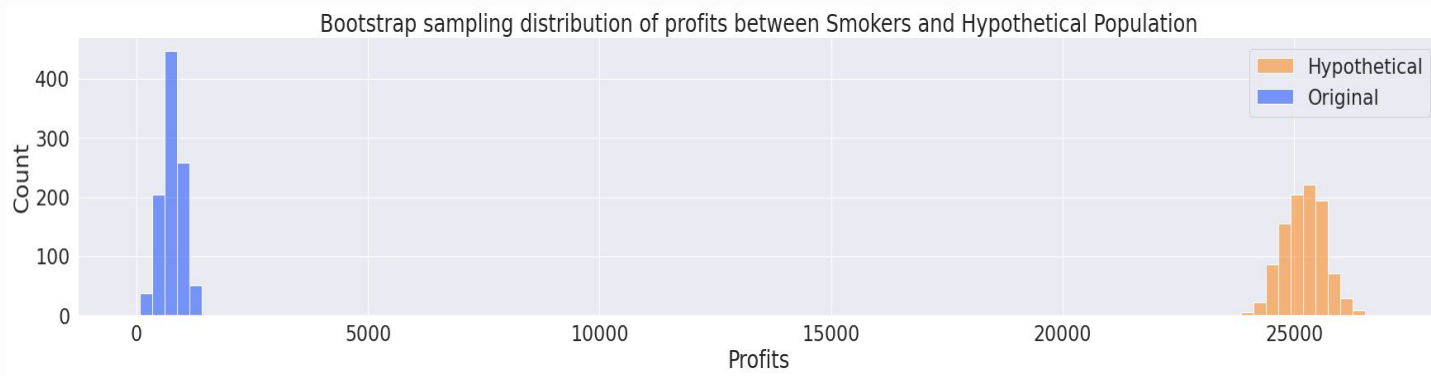


30 YEAR OLD
BMI:35
SMOKER
\$35,703

8.4x

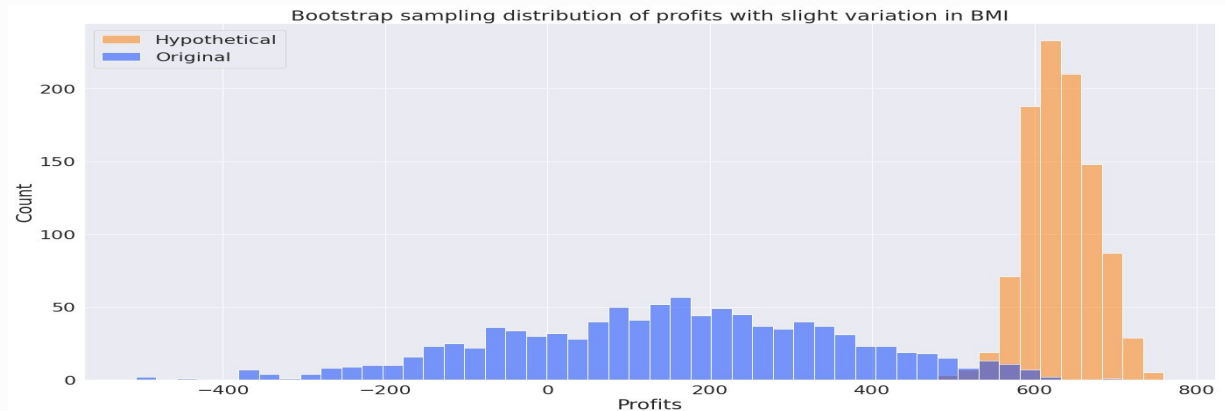


ACTIONABLES - EXISTING POLICY HOLDERS



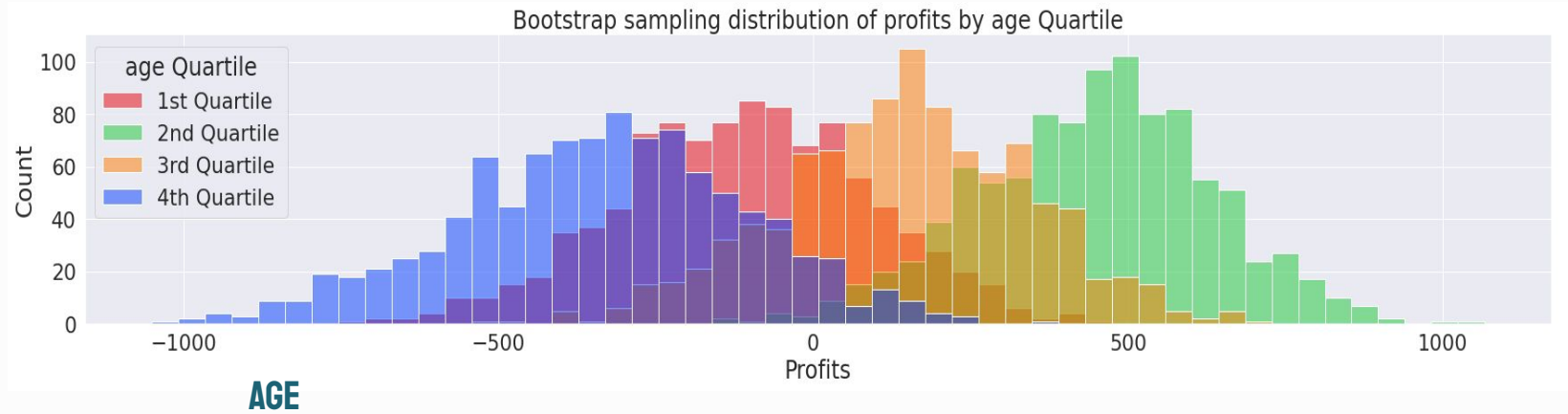
- The hypothetical and original sampling distribution were from the same set of test data with one difference - All smokers have decided to quit smoking
- Given the increased profitability if smoking policy holders quit the habit, the firm can actively encourage policyholders to quit smoking either through campaigns or incentives such as the lowering of premiums

ACTIONABLES - EXISTING POLICY HOLDERS



- The hypothetical and original sampling distribution were from the same set of test data with one difference - BMI has been reduced by 5%
- Given the increased profitability if existing policy holders were to reduce their BMI, it will be optimal for the insurance company to offer perks such as gym memberships. It can also offer reduced premiums as long as their policyholders achieve certain fitness milestones.

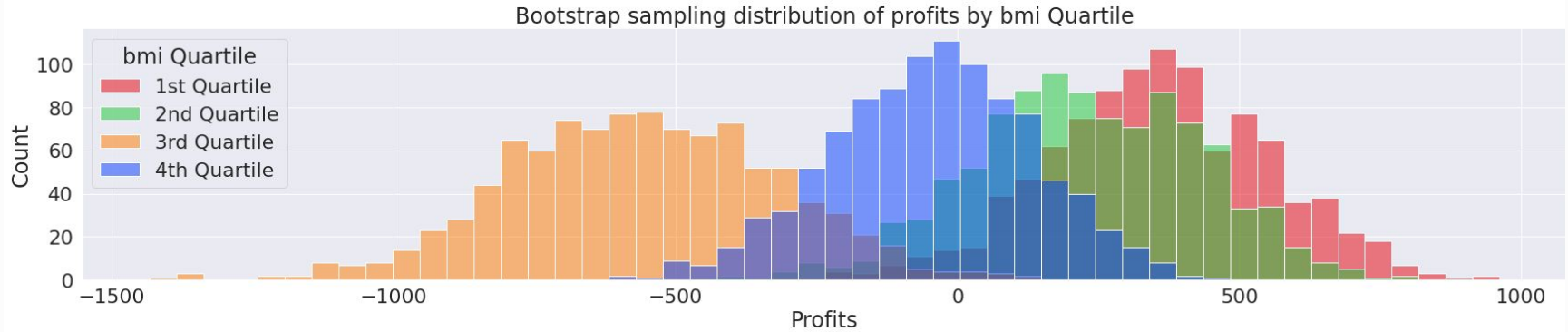
NEW MARKET SEGMENTS



1st Quartile	18 - 26
2nd Quartile	26 - 39
3rd Quartile	39 - 50
4th Quartile	50 - 64

- Can consider targeting those in the 2nd and 3rd age quartile
- Those in the 39-50 age range have typically been seen to be a less attractive age group to market insurance products to

NEW MARKET SEGMENTS



BMI

1st Quartile	16 - 26
2nd Quartile	26 - 30
3rd Quartile	30 - 35
4th Quartile	35 - 52

- Can consider targeting those in the 1st and 2nd BMI Quartile
- To Avoid the 3rd and 4th BMI Quartile due to the left tail risk

CONCLUSION



We can focus our retention budget at providing benefits to encourage reduction in BMI and Smoking. This will improve health outcomes, reduce hospital charges and increase profitability



We can focus on acquiring policyholders which are 26 to 50 years old and have a BMI of less than 30