Enhancing Decision-Making in Car Insurance

Predictive Insights for Company ABC

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Stakeholder and Problem Statement

The primary stakeholder is the insurance company (Company ABC)

1. Predicting whether a customer will make a car insurance claim or not. Therefore, this is a classification problem.

2. Helps in optimising premium pricing, underwriting, and risk management, ultimately enhancing the company's profitability and operational efficiency.

Project Data

1 The dataset used in this analysis is from Kaggle. It represents annual car insurance data, offering insights into real customer behaviors and interactions with their car insurance products.

2 The dataset contains a total of 10,000 rows, each corresponding to a specific customer, and 18 columns.

3 The columns include customer information such as age, gender, race, driving experience, education, income, credit score, vehicle ownership, and vehicle year, providing critical insights into customer characteristics
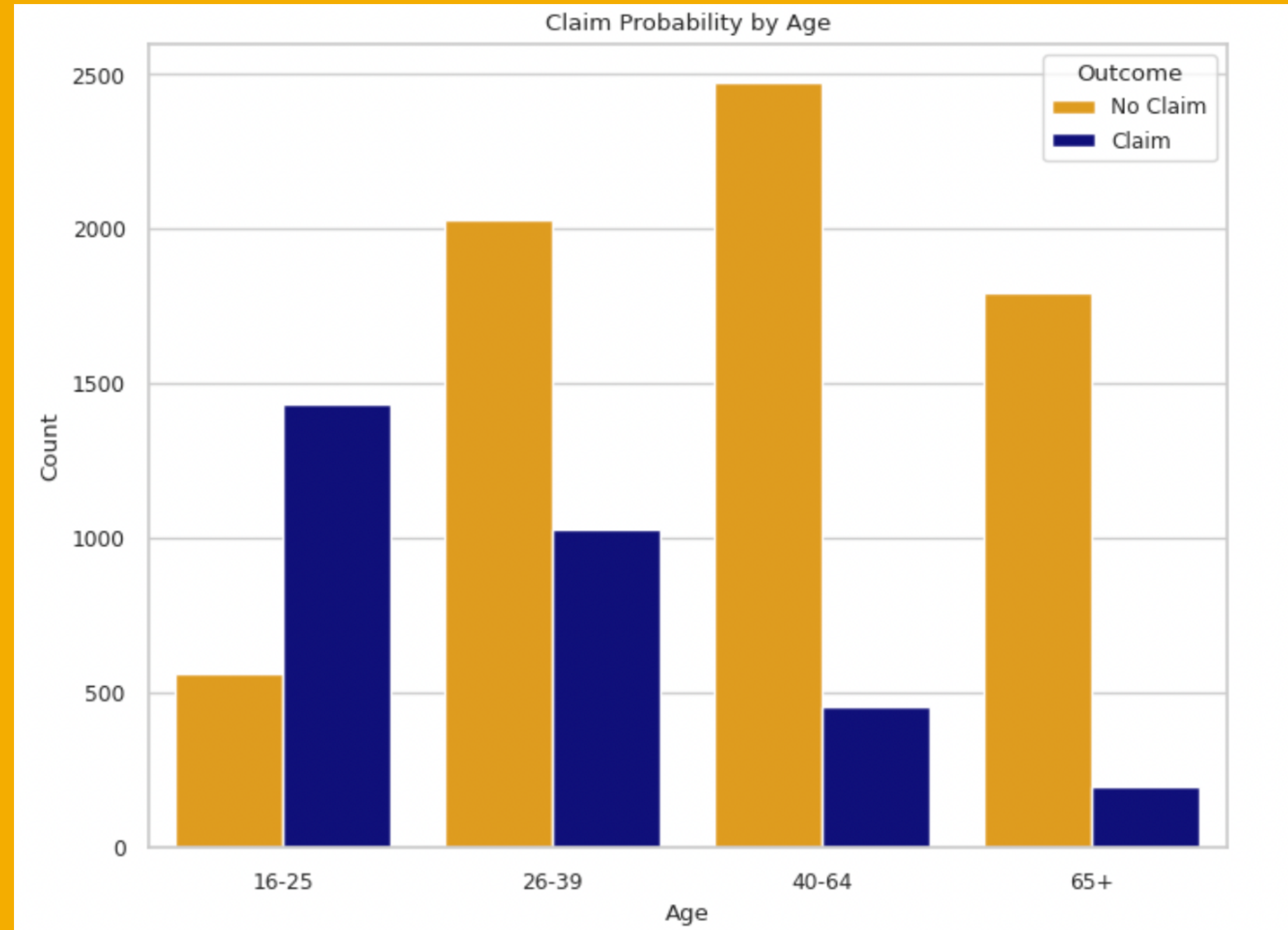
Key Findings

Customers aged 16-25 have the highest probability of making claims

Possible Reasons:
- Risky Behaviors: Younger drivers may engage in riskier driving behaviors.
- Experience and Caution: Older age groups may drive more cautiously due to experience and maturity.


Claim Probability by Age

Key Findings

Customers aged with 0-9 years of driving experience have the highest probability of making insurance claims

Possible Reasons:
- Inexperience: Drivers with less experience are more prone to accidents.
- Defensive Driving: Drivers with more experience may have safer driving habits and skills.

Claim Probability by Driving Experience
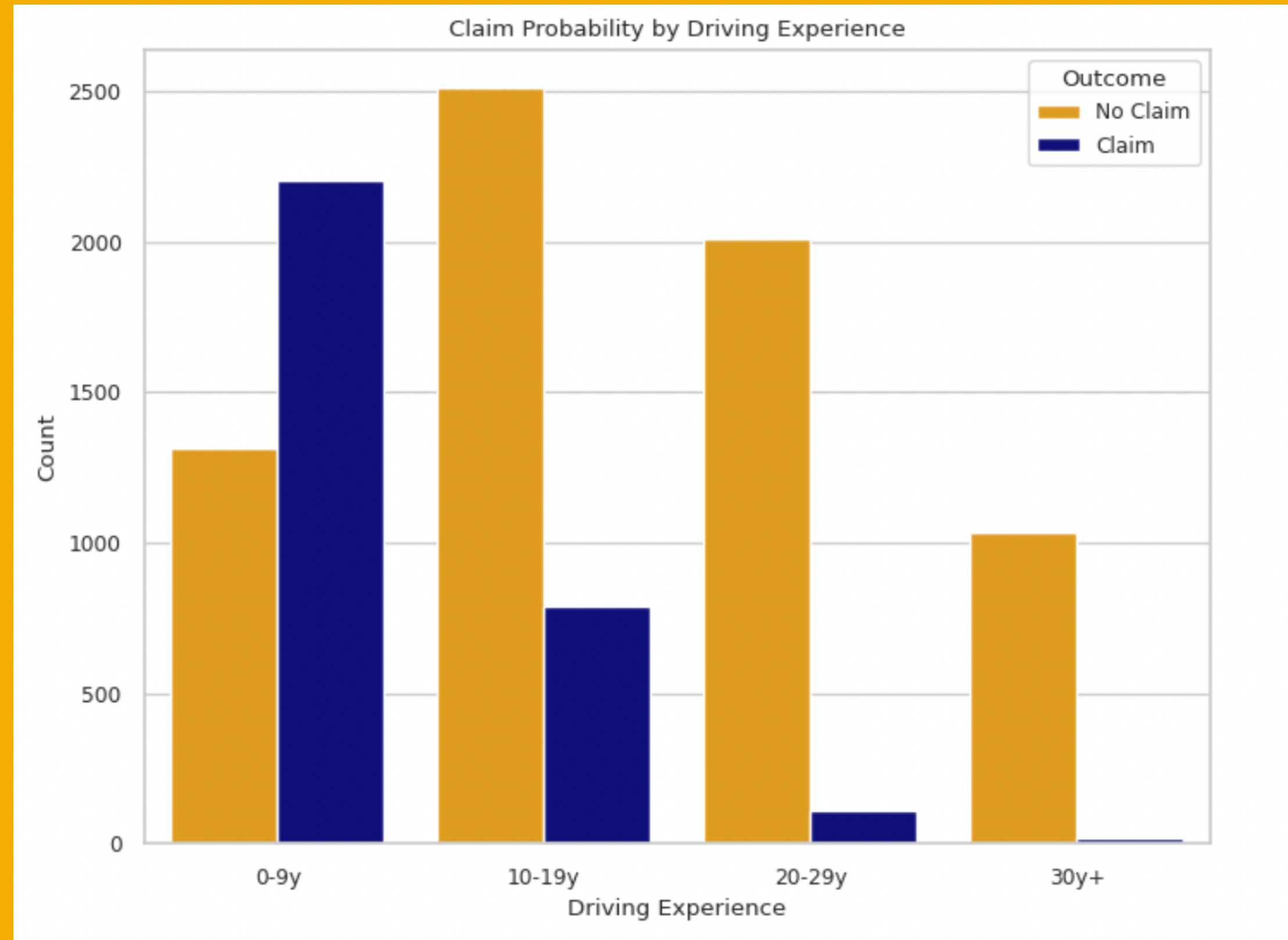
Key Findings

Customers with vehicles manufactured before 2015 have a higher probability of making claims compared to those with vehicles manufactured after 2015

Possible Reasons:
- Mechanical Issues: Older vehicles may have a higher likelihood of experiencing mechanical breakdowns or failures, resulting in claims for repairs or towing.
- Older vehicles may lack modern safety features, making them more prone to accidents that result in claims.

Claim Probability by Vehicle Year
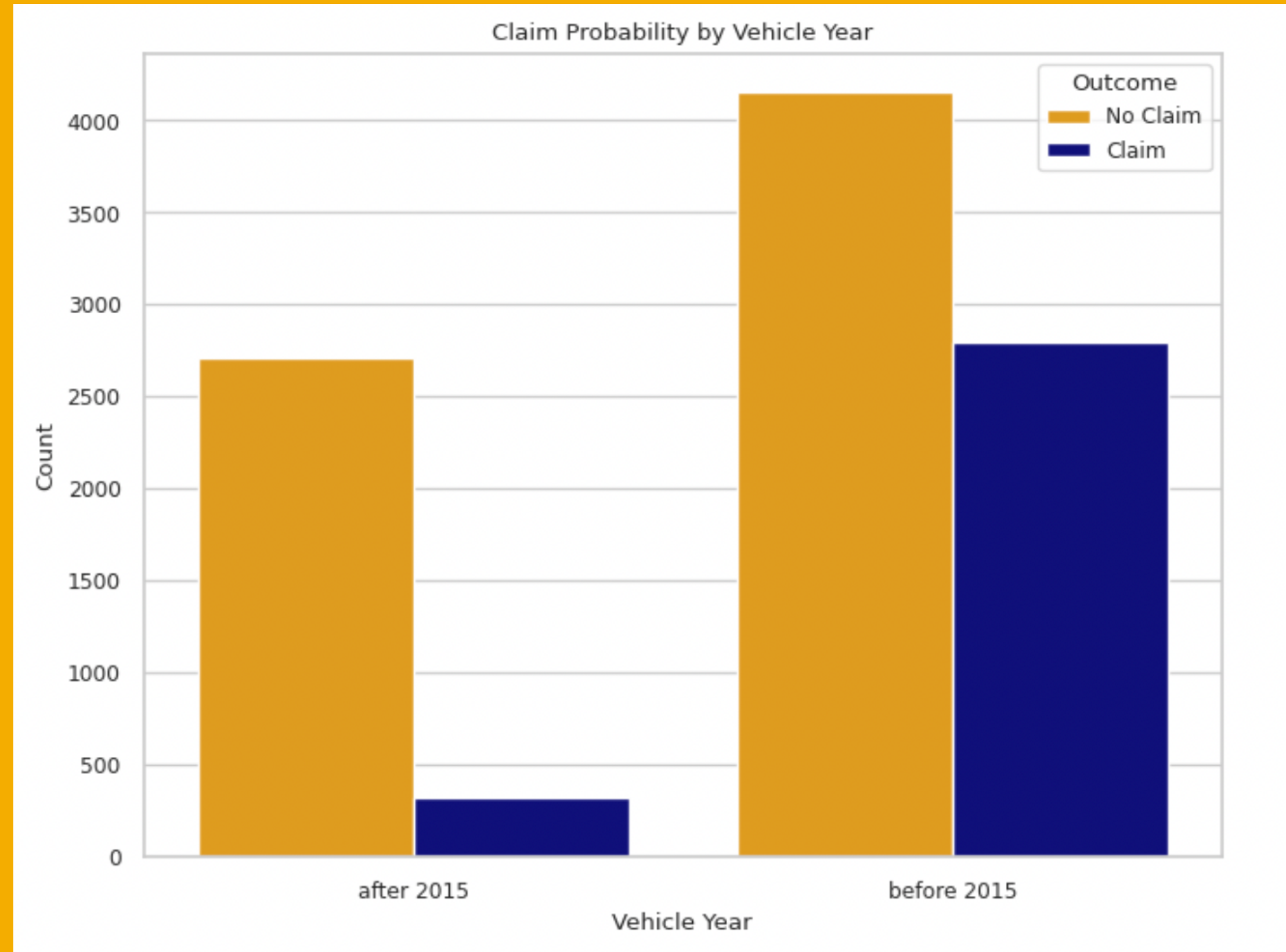
Model Strengths and Limitations

Strengths:

- **Accurate Predictions:** The model demonstrates strong predictive capabilities
  - The model is good at predicting non-claims almost 90% of the time, which means it can save the company from unnecessary investigations.
  - It correctly predicts real claims around 75% of the time.

Limitations

- There are 10% of cases where the model incorrectly predicted a claim when there isn't one. Impacts include:
  - Unnecessary Claim Investigations: Increased operational costs due to investigating customers with a low likelihood of claiming.

- There are 25% of cases where the model incorrectly predicted no claim when there is one. Impacts include:
  - Missed Opportunities: Failure to identify customers at high risk of claiming, potentially leading to financial losses.

Recommendations for Maximising Value from the Model

Integration with Operations:
- Seamlessly integrate the model into key operational processes such as underwriting and customer onboarding. This integration streamlines decision-making and optimises resource allocation.
  - For example, when a new applicant applies for insurance, the model instantly calculates the likelihood of that applicant making a claim based on information provided.

Customer Engagement:
- Leverage the model's insights to engage with customers proactively. For example, offer risk-reduction tips to high-risk customers or reward low-risk customers with discounts.