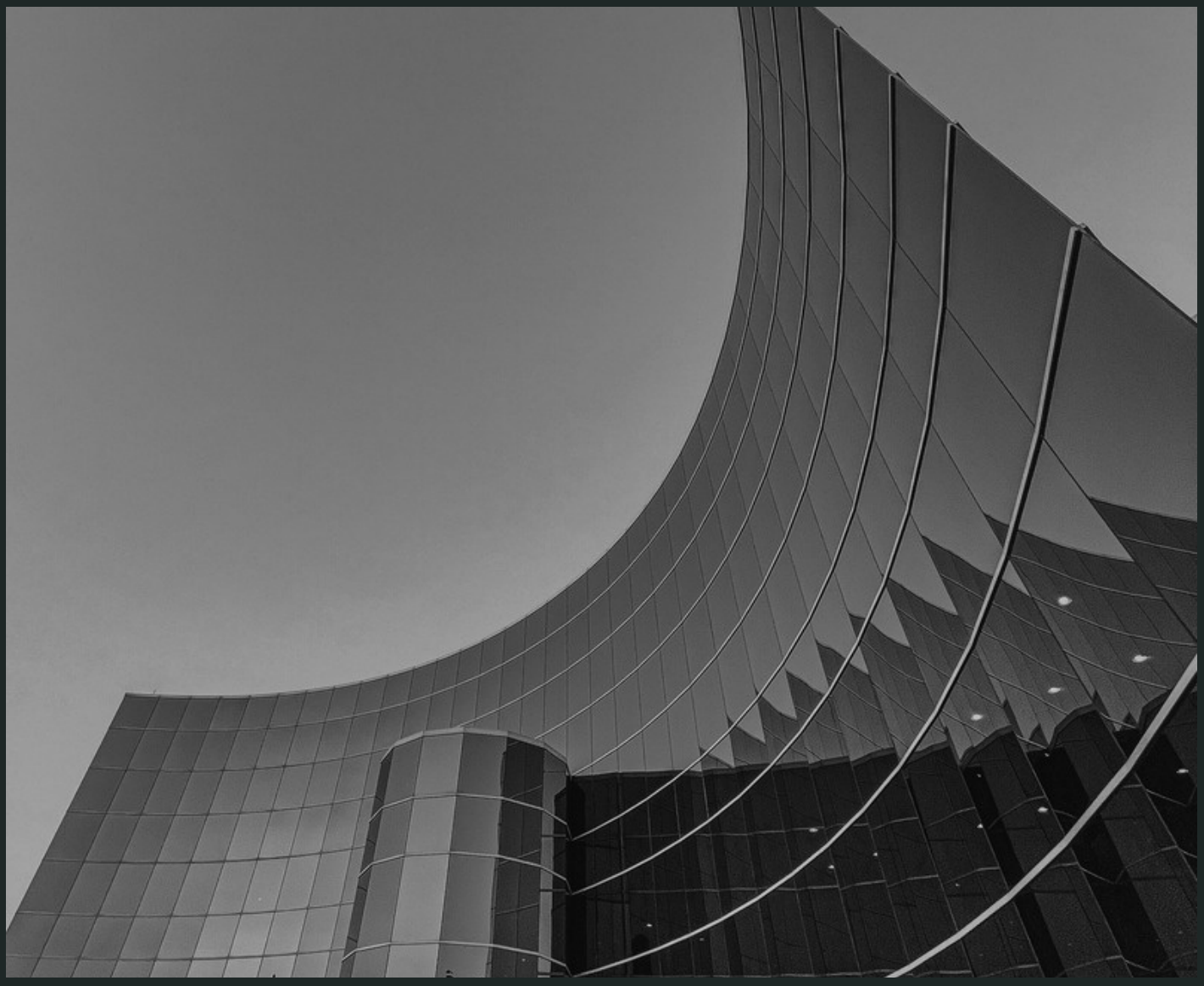
Revolut

EF308
Econometrics &
Forecasting



# INDIVIDUAL REPORT

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***VIEW OUR PRODUCT PITCH VIDEO HERE -Not uploaded yet***

# INTRODUCTION

Revolut has disrupted the financial sector with its innovative approach to currency transfer and easy-to-use trading systems. Currently, the app has more than 30 million registered users and is one of the world's largest-growing financial platforms. Traditional banks have taken notice of Revolut chipping away at their consumer base and have begun to copy the features Revolut is offering. However, we have identified a consumer need that both Revolut and traditional banks have not yet catered to.

# THE PROBLEM

Revolut offers users the ability to send and receive funds instantly, manage savings, invest in stocks and crypto, and even take out car loans. But for all these features there are no emergency funds in place for users to access.

Emergencies can arise at any moment, a wallet may be lost while travelling or an unexpected expense may arise. Revoluts current operations fall short in this regard, taking up to 7 days to verify accounts before they can make any payments.

> *"We always aim to complete your identity verification as soon as possible, but it may take up to 7 business days."*
>
> - Revolut Help

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# OUR SOLUTION

Introducing Revolut SwiftCredit a short-term credit solution. No longer a need for the lengthy verification process, users just need to provide basic information for instant approval.

Once approved users can immediately begin using the virtual card for purchases, transfers, cash withdrawals etc., all within the card's set limit.

Upon the card's expiration, the borrowed amount must be repaid through the Revolut app within 1 week, including all additional fees incurred.

## KEY FEATURES

- Instant Approval
- Short-term Credit
- Low Fees
- 1 Week Grace Period

# WHY SWIFT CREDIT?

**12%** Of Irish people lose their card while travelling.

**90%** Of Irish people value access to emergency funds while travelling

**7** Business days. How long it currently takes to get Revolut verification.

Sources: (Revolut, 2024) (ITTN, 2022)

Our research has shown that there is a clear market for Swift Credit, with more than 1 in 10 losing their bank card while they are travelling away from home, and of those surveyed, almost all said that they highly value access to emergency funds a service like SwiftCredit would provide.

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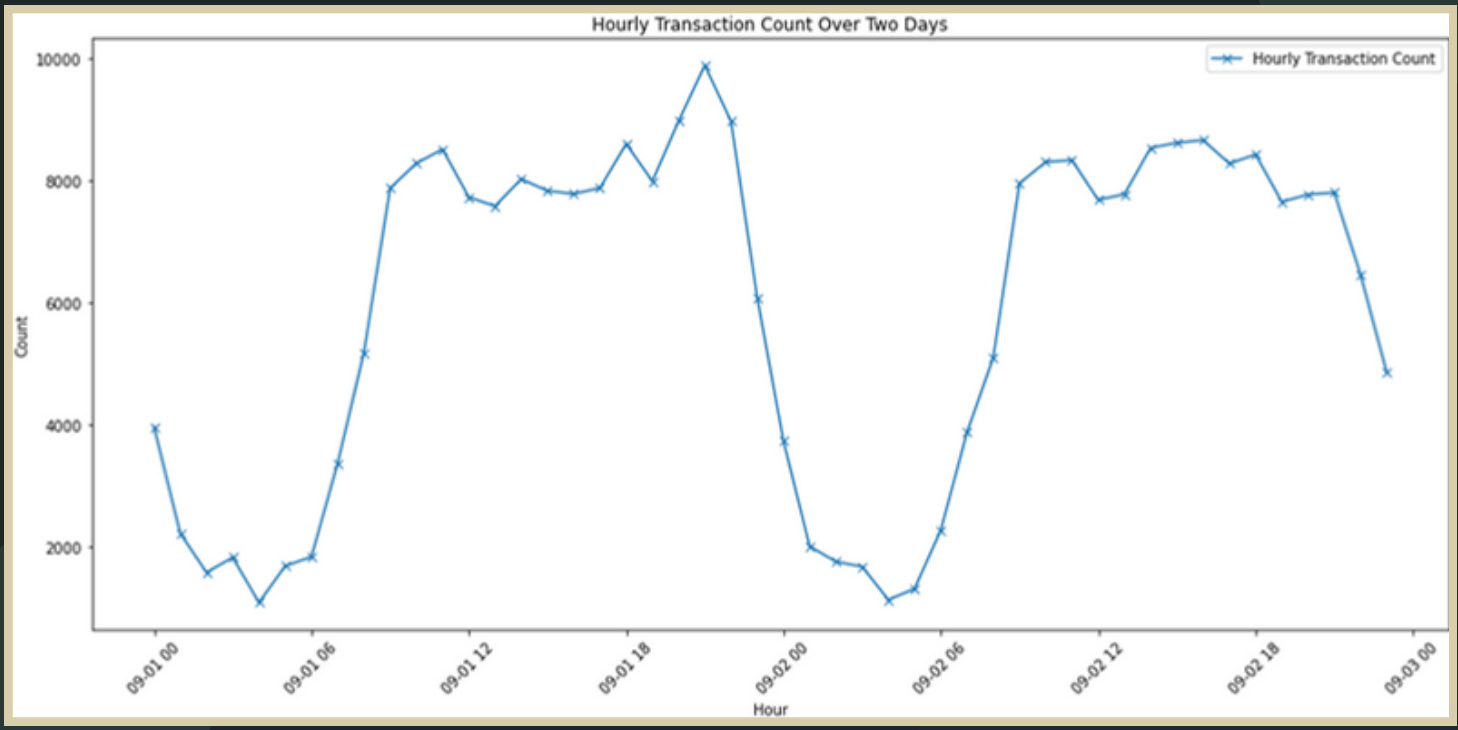
# WHAT'S IN IT FOR REVOLUT?

On average banks charge merchants a 1-3% fee on credit card transactions, in the case of SwiftCredit these charges would be passed onto the customer rather than the merchant. These small charges would compile and be required to be paid back to Revolut along with the balance of the card.

Sources: (Leonard & Bottorff, 2024)

## CONSISTENT REVENUE

Our data, although a limited time series of two days, does seem to indicate that there are consistent spending patterns when using credit cards. Meaning that SwiftCredit would provide a steady and constant stream of income for Revolut.



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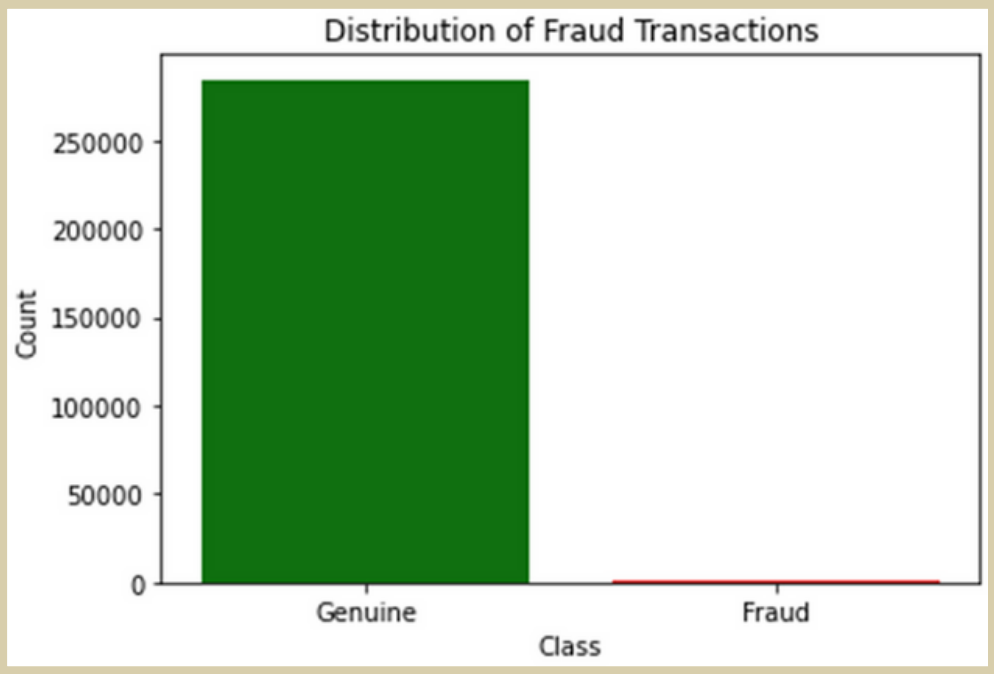
# POTENTIAL RISKS

Despite making up less than 1% of transactions fraud can have devastating effects. Along with huge financial damage fraud can cause irreparable reputational damage.




# THE DANGER OF FRAUD

The Federal Trade Commission estimates that there is a yearly loss of $1.86 billion due to fraud. The most common transaction method is credit cards. It is also estimated that stolen credit card details can sell for anywhere between $5 - $120 per card.
Revolut lost over $20 million due to fraud in 2022 alone.

**$1.86 Billion**

**Lost to fraud each year**

**$20 Million**

**Revolut Lost to fraud in 2022**

**Stolen details sell for up to $120 per card**

Sources: (Quinio & Venkataramakrishnan, 2023) (Federal Trade Commission, 2024) (Sweeney, 2023)

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# OUR MODEL

With credit card fraud posing such a huge risk, Revolut must have an effective and efficient system in place to ensure the security of SwiftCredit. That is where our model comes in. We have taken credit card transaction data over 48 hours and with it created a fraud detection model. This model can predict whether a transaction is fraudulent or genuine with 99% accuracy, as well as identifying 98 out of every 100 fraudulent transactions.

### KEY FEATURES

- 99% Accuracy
- Identify 98/100 frauds
- Quick implementation
- Repeatable results

# LOOK TO THE FUTURE

### KEY FEATURES

- Predict transaction costs
- Identify spending patterns
- UInderstand customer behaviour

Along with our fraud detection model, we have also built a model that will allow Revolut to predict the future. Our forecasting model lets Revolut visualise and understand transaction patterns, including the number of transactions and the value of these transactions. Most importantly, however, this model will allow Revolut to predict the specific amount of each transaction, allowing for tailored spending recommendations or limiting consumer spending at certain times.

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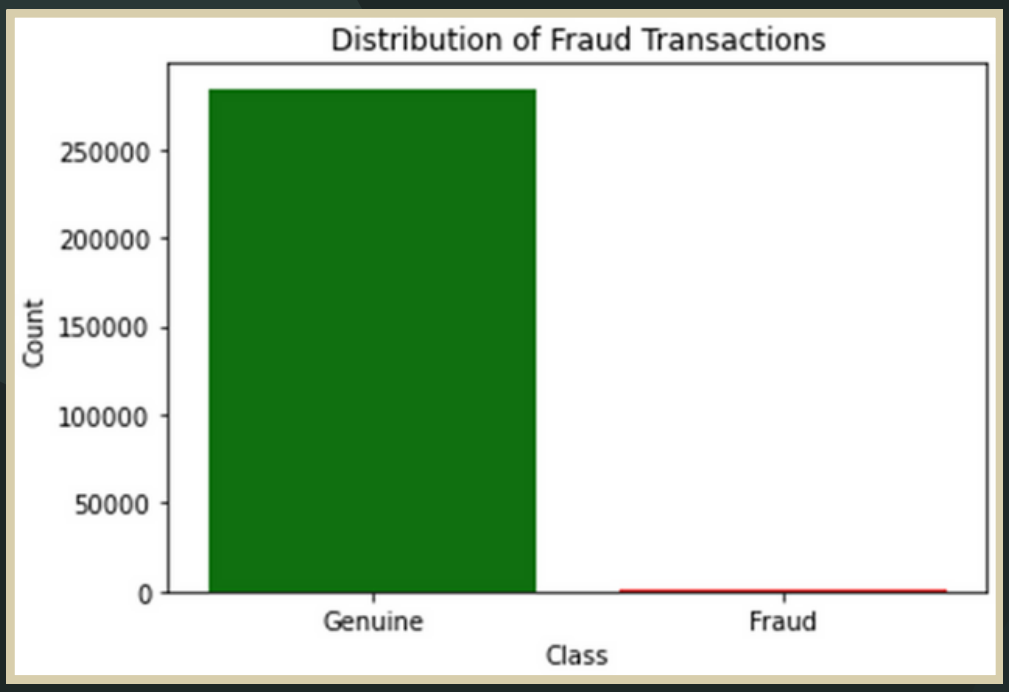
# THE DATASET

Before we discuss how the model was constructed and how it operates we need to understand the dataset that was used to create it. The dataset contains credit card transactions over a period of 48 hours. It contains 28 unnamed numeric columns(features) gained through principal component analysis, which have been standardised. Along with these features, the data also contains a class column, defining if a transaction was fraud or genuine, an amount column, and a time column, measuring the time in seconds from the first transaction

# PREPARING THE DATA




Firstly we check if the data has any null values, the model will not work accurately other wise. Next, we look to understand the prevalence of fraud transactions. In our dataset fraud accounts for less than 1% of transactions.

**284,807**
Total Transactions

**492**
Fraud Transactions

**0.17%**
Fraud Transactions

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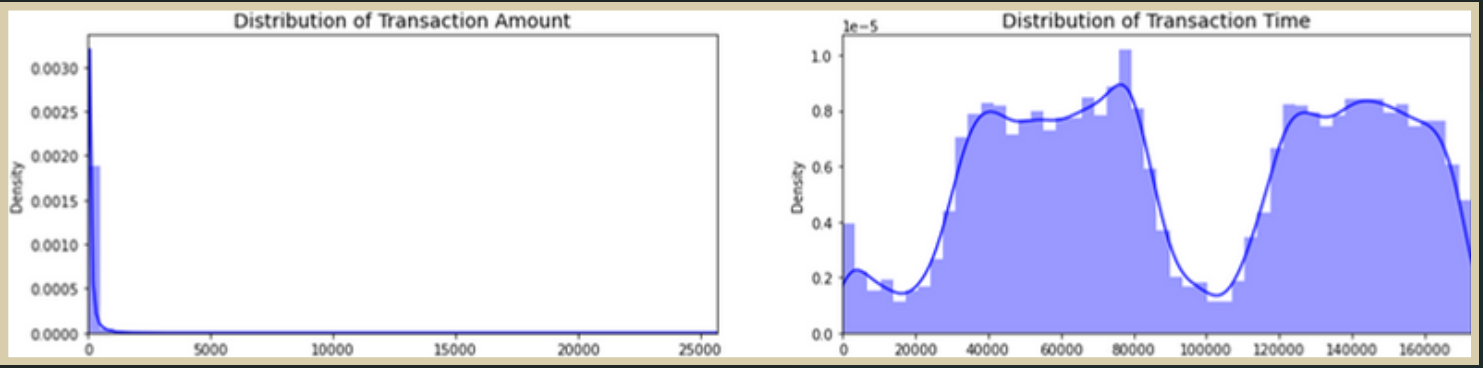
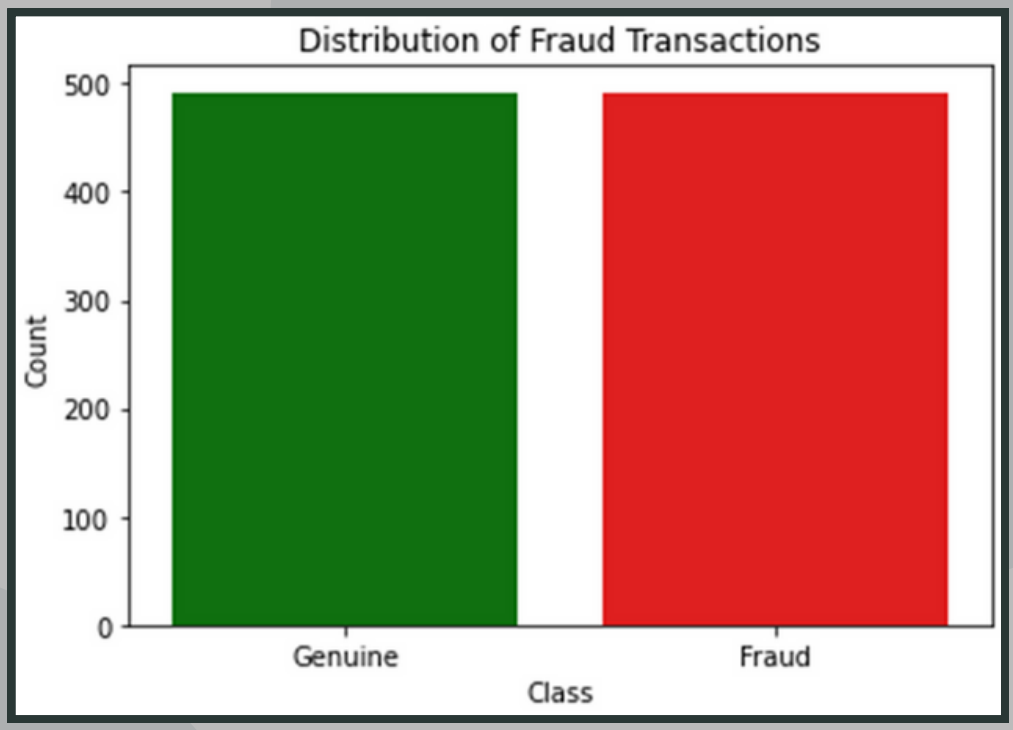
# PREPARING THE DATA

As we mentioned previously all columns bar time and amount have been standardised. This means that all data needs to be brought to a common scale. As we can see time and amount are measured on different scales, if we left this our model and insights would struggle to accurately represent the impact of these data points.




# BRINGING BALANCE

We need our model to be highly sensitive to fraud transactions, as it stands our model would be biased towards predicting a transaction as genuine due to the lack of fraud data. To fix this issue we will create a sub-set of the data with a 50/50 split of fraud and genuine transactions.

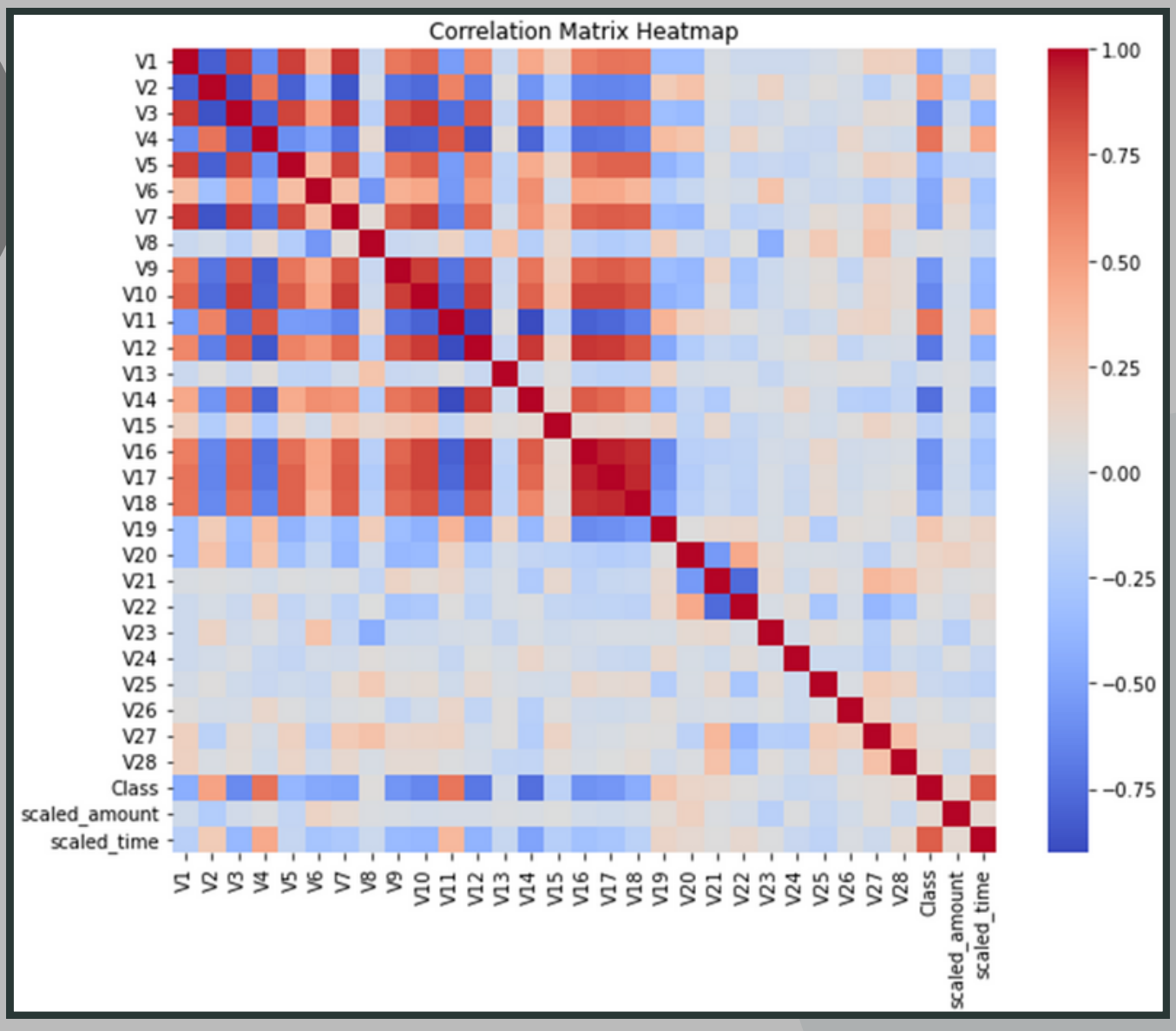


# PREPARING THE DATA

This subset lets us more accurately view which aspects of the data frame have a strong correlation with one another, as the features are unnamed we will focus on what features are strongly correlated with class i.e. whether a transaction is fraud or not.

# CORRELATED FEATURES

- V17
- V14
- V12
- V10
- V19
- V11
- V4
- V2



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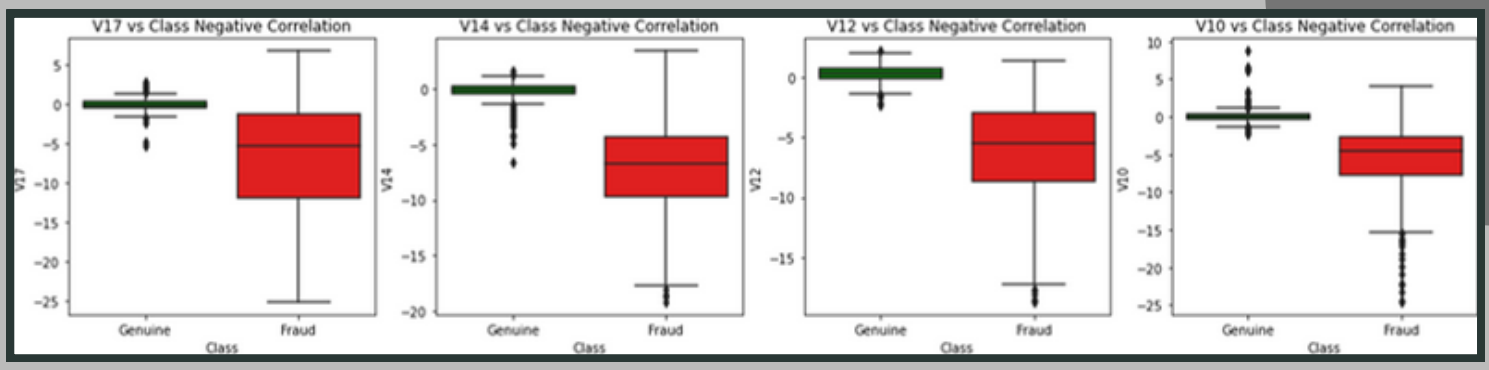
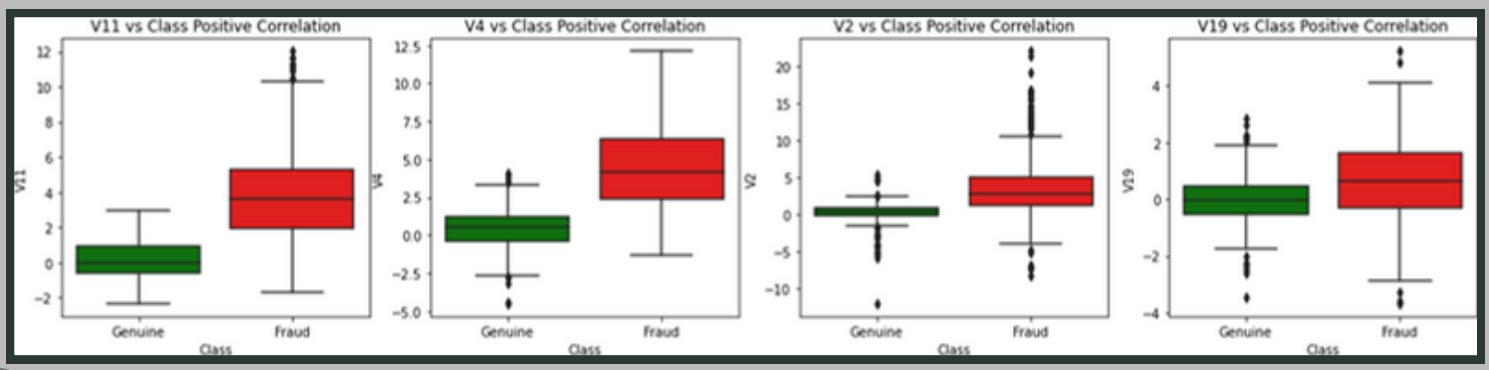
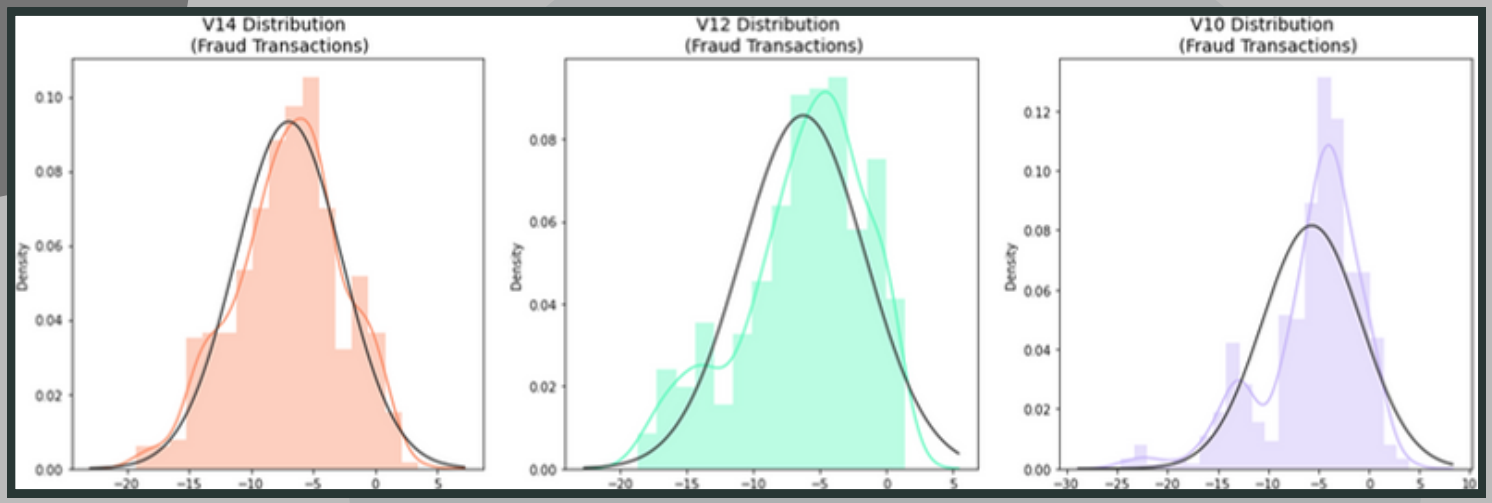
# REMOVING OUTLIERS

As fraud itself is an outlier we want to remove, only extreme outliers from the features we have identified. Firstly we will plot these features to visualise the outliers.




We will remove outliers from V14, V12, and V10. If we remove outliers from more features it increases the likelihood of overfitting our model. As only V14 is normally distributed we will use the interquartile range method to remove outliers.



# DETECTING FRAUD

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Our data is now fully prepared to begin creating the fraud detection model. We will split our data into two subsets. Of this subset, 80% will be used for training and 20% for assessing the model performance. Once the model is fitted to the training data we can begin making predictions.

We can see that our model has an extremely high accuracy, being able to predict if a transaction is genuine or fraud with 99% accuracy. Our model is also 100% accurate in its prediction of fraud (precision) and can identify 98 out of every 100 fraud transactions (recall).

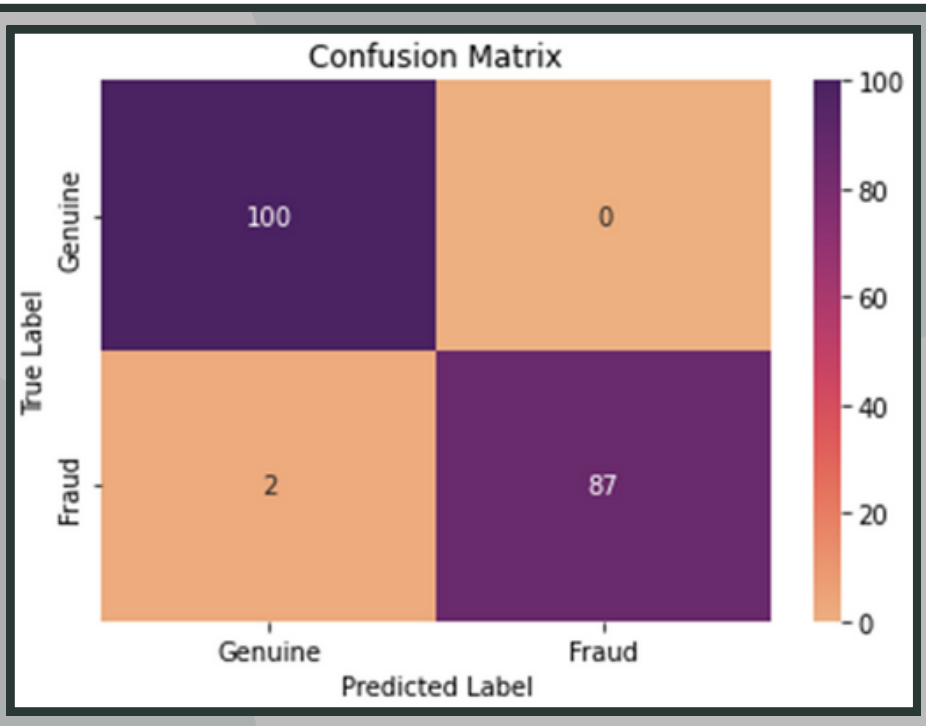
## WHAT DOES THIS MEAN?

The model having 100% precision means that it has recognised patterns in fraudulent transactions. With the 98% recall likely meaning the fraud it could not detect was extremely rare cases.

In short, this means Revolut can implement SwiftCredit with peace of mind. Knowing they have a reliable and repeatable model to detect fraudulent transactions

Logistic Regression Report:

| | precision | recall | f1-score | support |
|---|---|---|---|---|
| Genuine | 0.98 | 1.00 | 0.99 | 100 |
| Fraud | 1.00 | 0.98 | 0.99 | 89 |
| accuracy | | | 0.99 | 189 |
| macro avg | 0.99 | 0.99 | 0.99 | 189 |
| weighted avg | 0.99 | 0.99 | 0.99 | 189 |



# PREDICTING THE FUTURE

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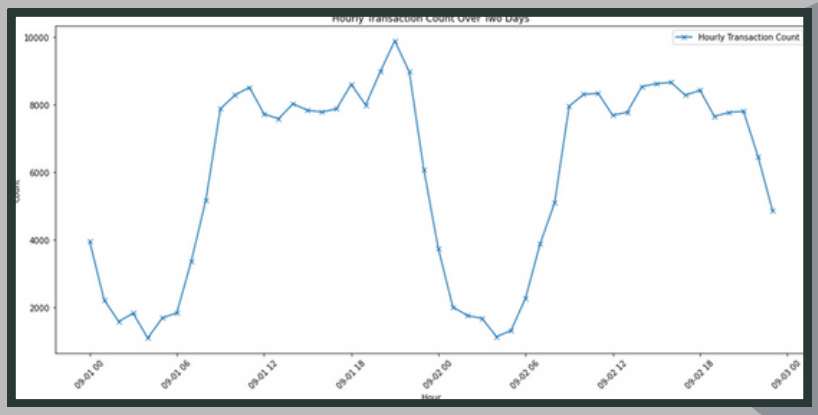
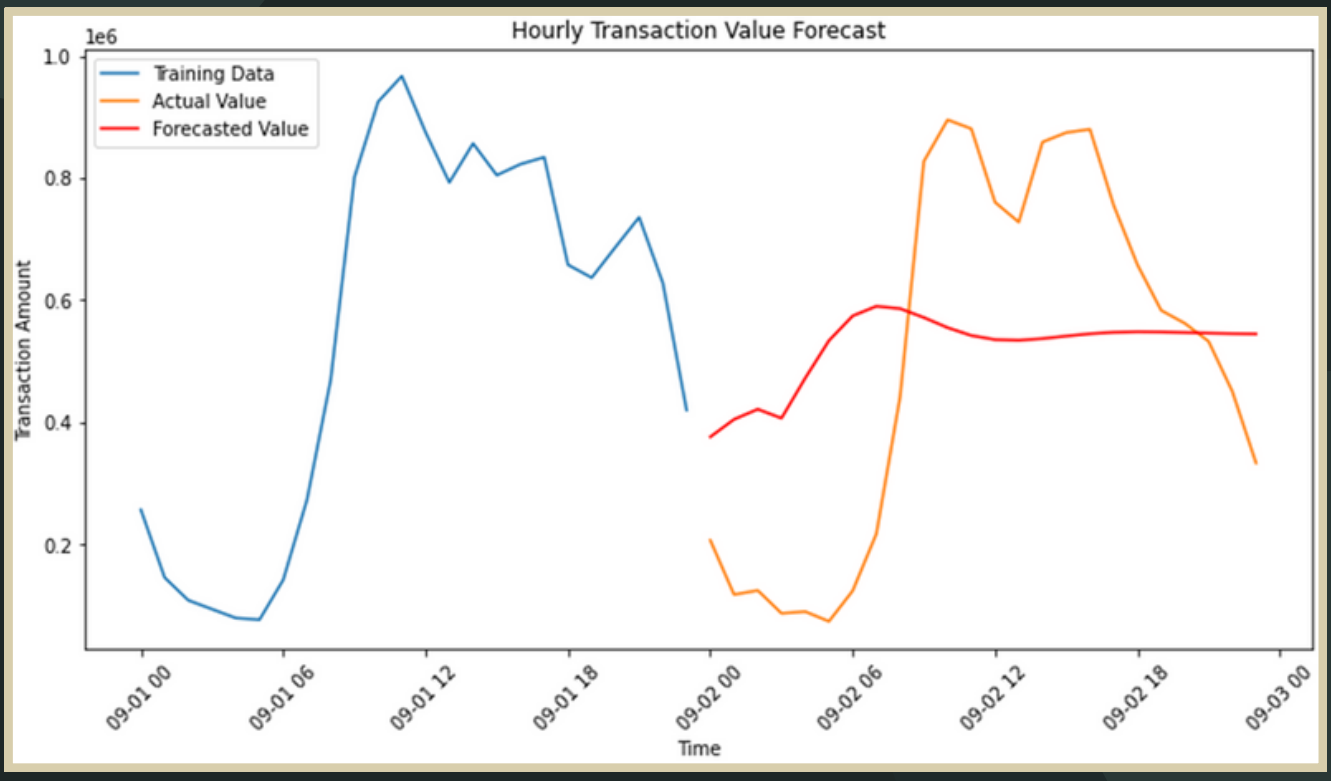
Along with our fraud detection model, we have also created a model to forecast transaction values. Due to our time series being limited, we divided the transactions into hourly blocks across the 2 days.




This not only gives us a larger timeframe to analyse but also allows us to view any time-based trends in the data, such as peak times for transaction value or the number of transactions

# FORECASTING MODEL

To carry out forecasting we use an ARIMA model. Our AIC and BIC both return parameters of (2,5), we set the middle parameter as 0 as our data does not need to be differenced. Then we train our model on the first day of transactions and use the second day to make predictions. Due to the limited time series, our model is not very accurate, however, more data would allow for accurate predictions of transaction value over time.



# CONCLUSION

SwiftCredit will provide Revolut with a consistent stream of revenue as well as increase its already growing customer base. For this to be implemented safely Revolut needs a robust and secure mechanism to detect fraudulent transactions. Our fraud detection model can identify patterns in fraud with 100% precision., meaning Revolut can implement SwiftCredit with peace of mind.

We have also provided a forecasting model which can help Revolut identify potential profits from implementing SwiftCredit. Viewing transaction consistency and predicting transaction value over time helps Revolut understand the potential income received from SwiftCredit fees.

Although our forecasting model is not particularly accurate, our analysis and graphs show that there are underlying transactional patterns. Meaning that with a larger time series, we could accurately forecast transaction amounts.

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