Group - 15

Credit Risk

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INTRODUCTION

This project focuses on analyzing consumer complaints related to Unfair, Deceptive, or Abusive Acts or Practices (UDAAP) from the Consumer Financial Protection Bureau (CFPB) database. The objective is to identify trends, patterns, and underlying themes in UDAAP complaints across various financial institutions, and assess their relationship with economic indicators and complaint resolution outcomes.

Data Collection & Filtering Approach

- Filtered for Narratives Only: Focused on complaints with consumer narratives for richer context (structured fields were too generic).
- UDAAP Keyword Search: Used ~20 UDAAP-specific keywords (e.g., "unauthorized", "mislead", "threaten") to identify relevant complaints.
- Created Refined Dataset: Retained only complaints with these keywords to focus on likely UDAAP-related issues.
- Timeframe Consideration: Used data from Jan 2016 onwards, when narrative submissions became more common.

Trend in UDAAP Complaints Over Time
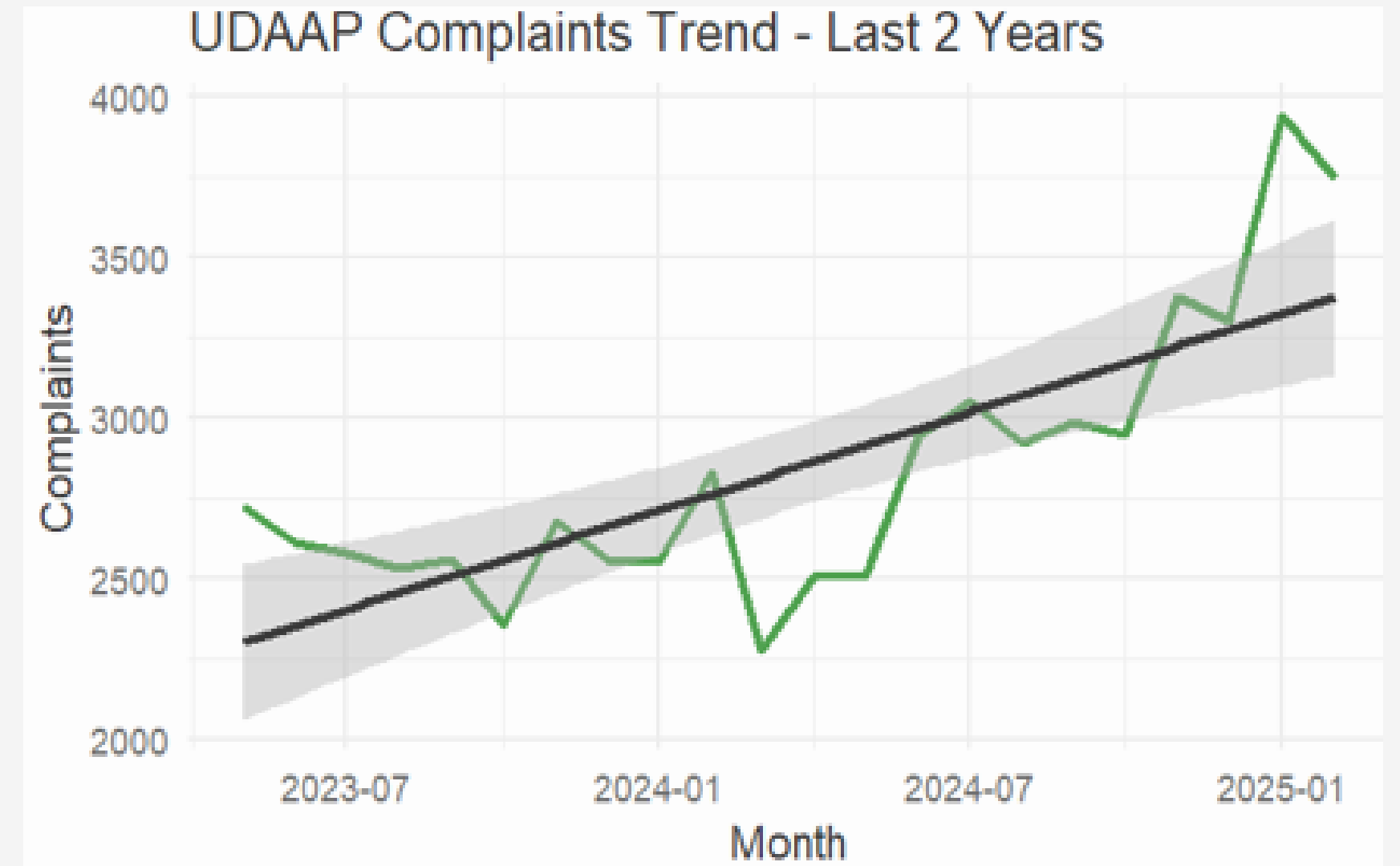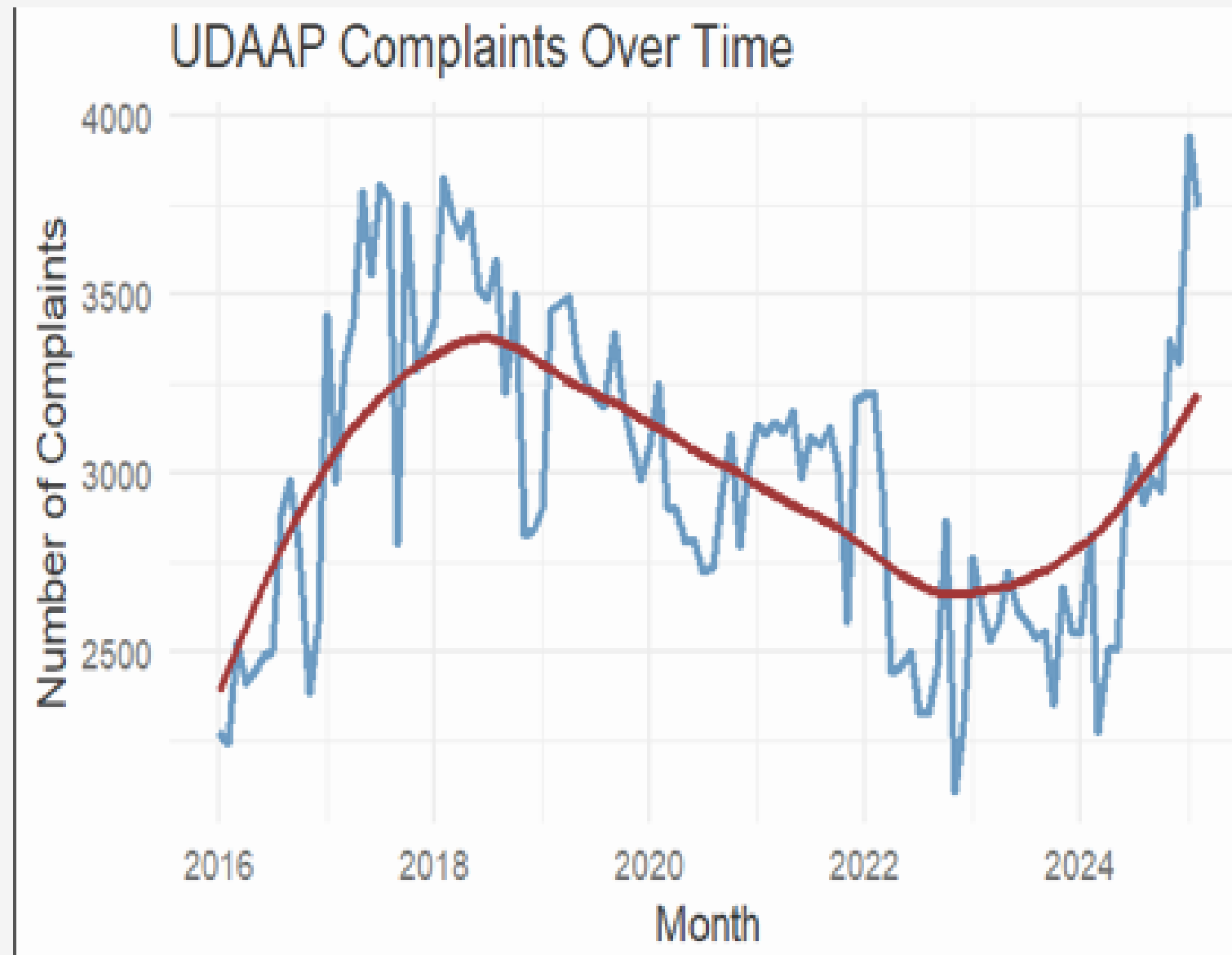
We can observe a upward trend . To see is this is statistically significant, we applied a simple linear regression. The model showed that the number of complaints increases by about 1 complaint per month on average. We got a p-value of 0.0487.

Banks with steepest growth in complaints

METHODOLOGY:
- Aggregated monthly UDAAP-related complaints by company.
- Filtered out companies with fewer than 24 months of data to reduce noise.
- Applied linear regression to each company's monthly complaint trend.
- Positive slope → growing complaints; higher slope → faster growth.

Top 5 companies with steepest complaint growth:
- TransUnion Intermediate Holdings Inc.
- Equifax Inc.
- Experian Information Solutions Inc.
- Navy Federal Credit Union
- Resurgent Capital Services L.P.


Complaint Trends Over Time for Top 3 Companies
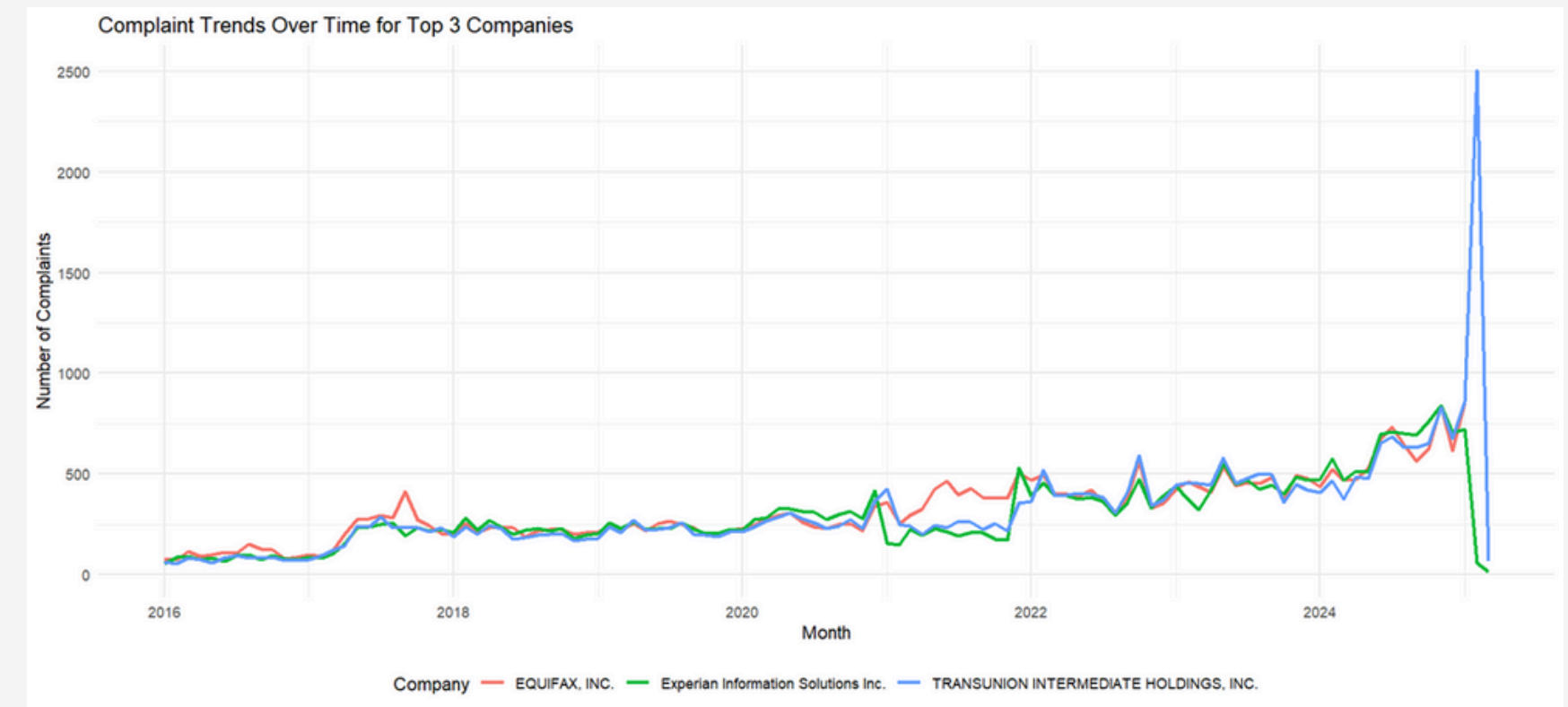
Potential reasons:
- Increased customer base, Data breaches like Equifax breach in 2017.
- Debt collection : As a debt collector, Resurgent is involved in handling charged-off debts, leading to disputes about the validity of the debt.

Time Series Modeling and Forecasting of UDAAP Complaints

To choose which model we should use to forecast, we used following plots:
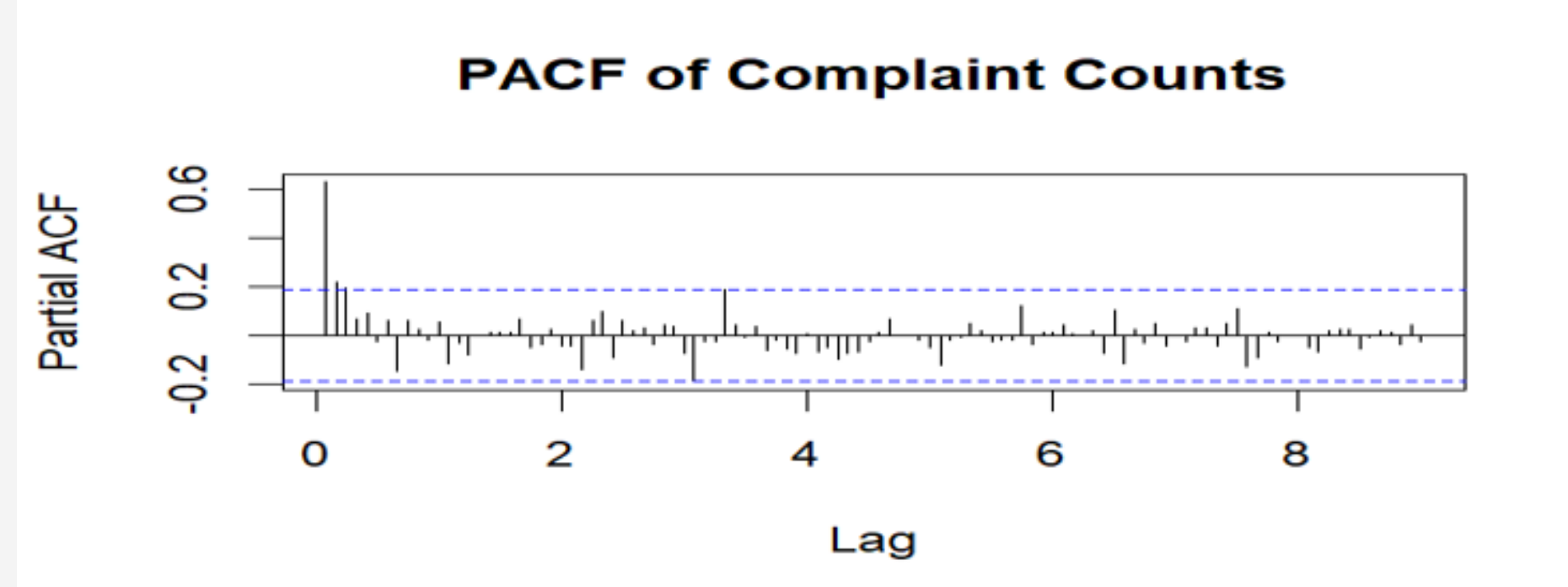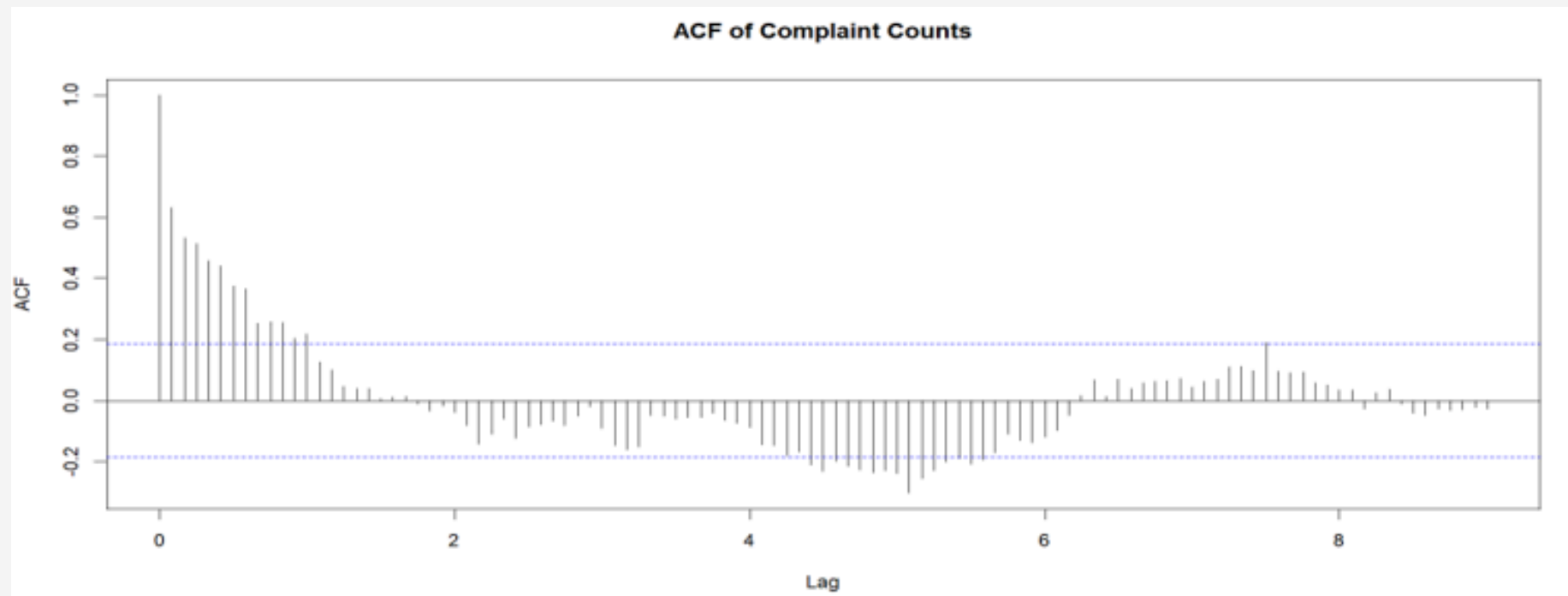
The ACF plot shows an autocorrelation structure that is clearly non-stationary. The up-and-down wave pattern suggests a possible cyclical pattern or seasonality. The PACF plot shows a significant spike only at lag 1, with all other lags falling within the confidence bounds. This implies that only the previous month's complaints have a direct impact on the current month, and further lags do not contribute additional explanatory power.

So, we decided to go for **SARIMA Model** which which capture both trend and seasonality (if any).

Model Results

The SARIMA model fits the data well, with a relatively low forecasting error. Mean Absolute Percentage Error (MAPE), a metric that measures the average absolute percentage difference between predicted and actual values, below 10% is typically considered a strong result in time series forecasting. Our MAPE is 7.58%, indicating a good model fit.
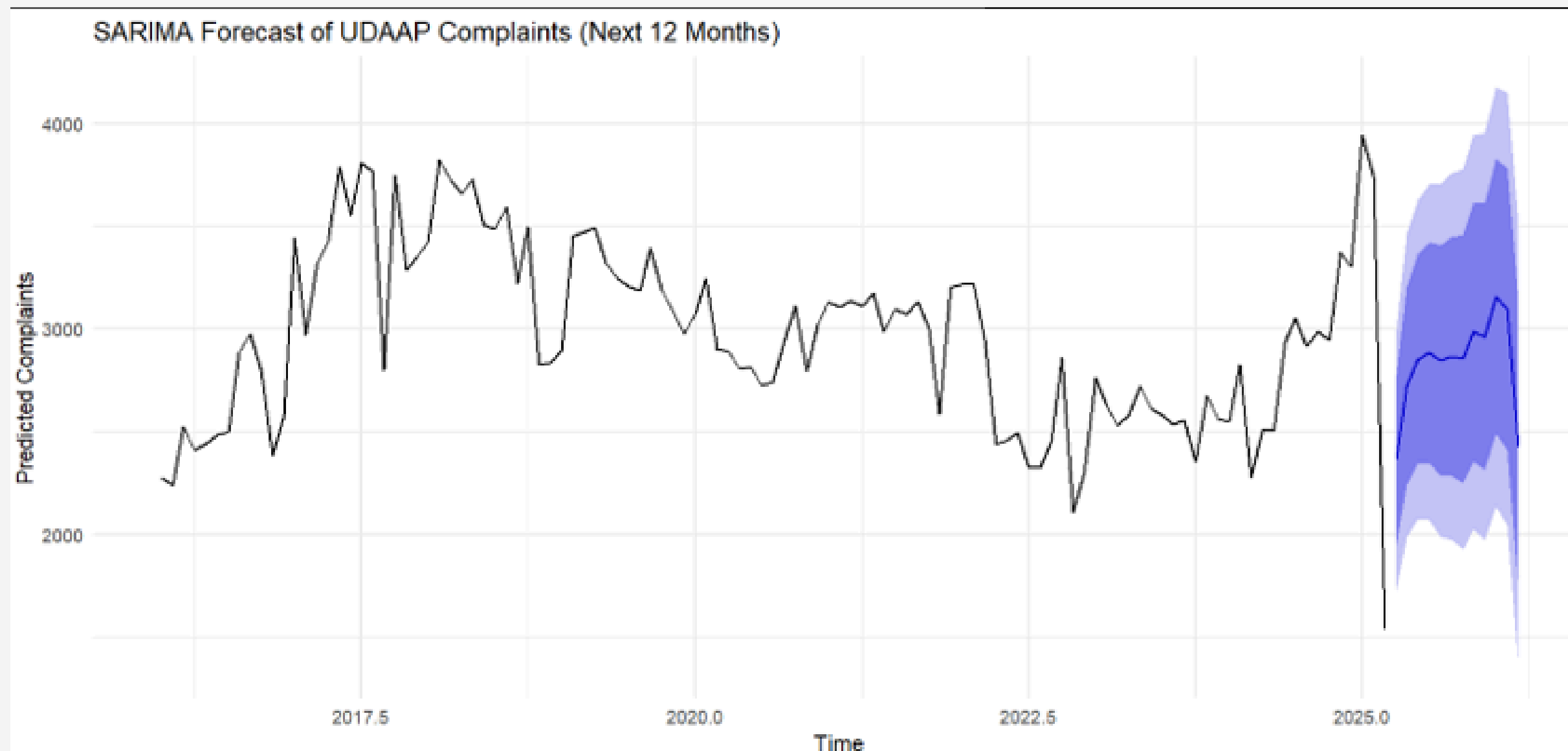
Macroeconomic Indicators and UDAAP Complaints

Objectives are **to test** if:
- Monthly UDAAP complaints correlate with monthly unemployment rates (Feb 2023 – Mar 2025).
- Monthly UDAAP complaints correlate with monthly inflation rates (Jan 2016 – Mar 2025).
- Annual UDAAP complaints correlate with monthly unemployment rates (2016-2024).

We used **linear regression model** to test, our findings are:
- Monthly unemployment rates showed significant positive correlation (p-value = 0.00139).
  - As unemployment increases, UDAAP complaints also rise.
  - Possible reason: Financial stress during unemployment → more credit use → more disputes and complaints.
- Annual unemployment rate (2016–2024): No significant correlation with complaint volume.
- Monthly inflation rate (Jan 2016 – Mar 2025): Significant negative correlation.
  - As inflation rises, UDAAP complaints decrease.
  - Reason: Higher inflation → higher interest rates → reduced borrowing and credit use → fewer complaints.

Themes in UDAAP Complaints and Delays in Resolution Across Major Banks

Analyzed consumer complaint narratives for UDAAP-related keywords:
- Complaints largely focused on **debt collection** and **credit reporting**.
- Other Common issues were Incorrect information on credit reports, Debt not owed, Ineffective investigations, Improper or unauthorized use of reports

For the institutions with the highest number of reported complaints
- Equifax: Most complaints tied to investigation handling—suggests issues with transparency and responsiveness.
- TransUnion & Experian: Frequent reports of inaccurate data—may reflect problems in data validation or quality control.
- All Major Bureaus: Unauthorized access/use of credit reports raises UDAAP concerns around privacy and consent.

We analyzed UDAAP-related complaints for signs of delays in resolution across four major U.S. banks: JP Morgan Chase, Discover, American Express, and Capital One. Among these institutions, only **JP Morgan Chase** exhibited a notable pattern of delayed resolution. A deeper look into the complaint narratives revealed that the underlying theme often involved **misleading information**. Consumers felt they were given inaccurate or confusing explanations regarding fees, terms, or account actions

Evaluation of Relationship Between Negative Sentiment and Resolution Times

Sentiment Classification:
- Used a lexicon-based approach to label complaint narratives as either "Negative" or "Not Negative."
- Words like threat, fraud, scam, mistake, disappoint were used to identify negative sentiment.

We can see from graph that "Not Negative" complaints received timely responses more often than "Negative" ones which indicates a potential link between sentiment tone and response delays.

Chi-Square Test of Independence showed a significant relationship:
(χ^2 = 11.156, p = 0.0008378)

Proportion of Timely Responses by Complaint Sentiment (Balanced Data)