

SPLV Prediction using ARIMA and Facebook Prophet

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Context

The stock market is a complex and highly dynamic environment influenced by numerous factors, making accurate stock analysis difficult.

However, stock predictors still have values as it can be used to make informed decisions and maximize returns.

To reduce risk and increase the accuracy of predictions, the focus will be on stocks with a history of low volatility and variability, often found in ETFs (Exchange-Traded Funds).



Problem

The objective of this project is to develop a predictive model for ETFs with low volatility using time-series forecasting model such as ARIMA and Facebook Prophet, aiming to predict stock prices accurately. Success will be measured by metrics such as MAE and RMSE, with a timeline of 1 week for data collection, analysis, and evaluation. This project will showcase advanced machine learning techniques and provide visual comparisons of actual vs. predicted stock prices for informed investment decisions.



Stakeholders



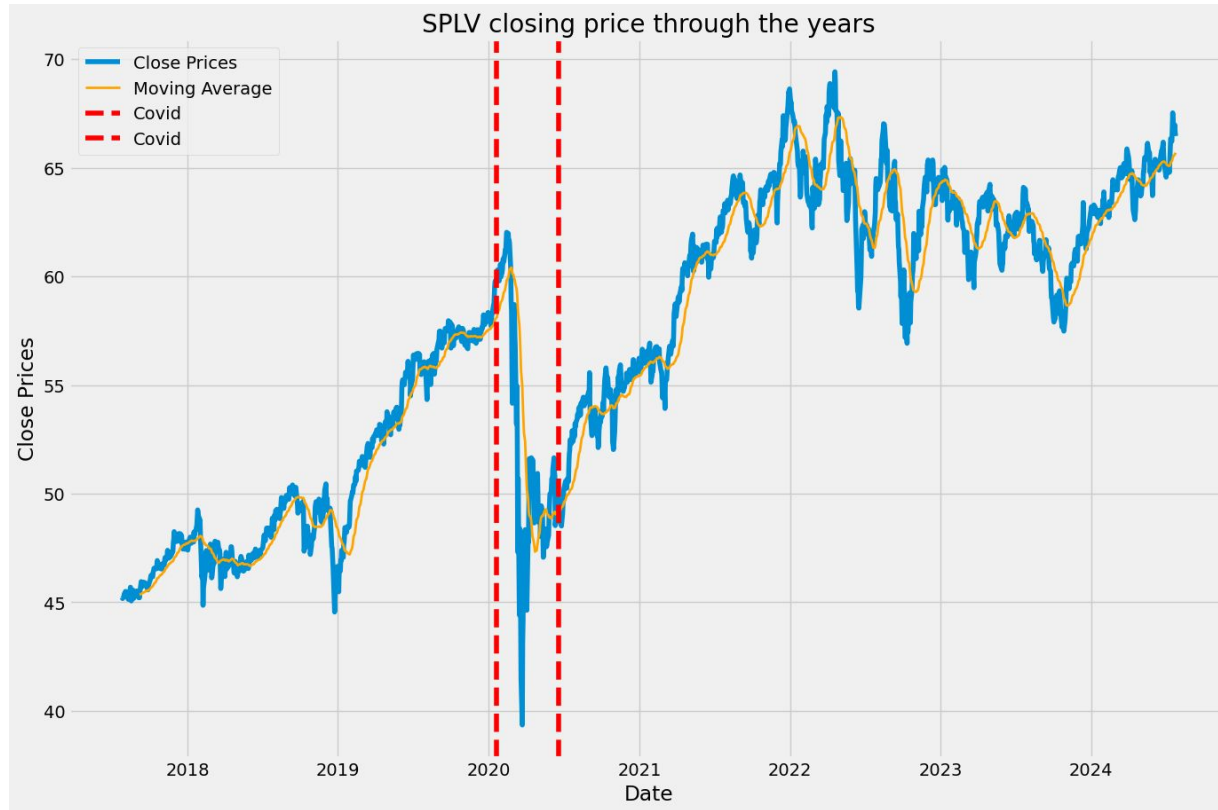


The Data

Data was sourced from Yahoo Finance, providing 7 years' worth of SPLV data. This extensive dataset is sufficient to effectively test our models.

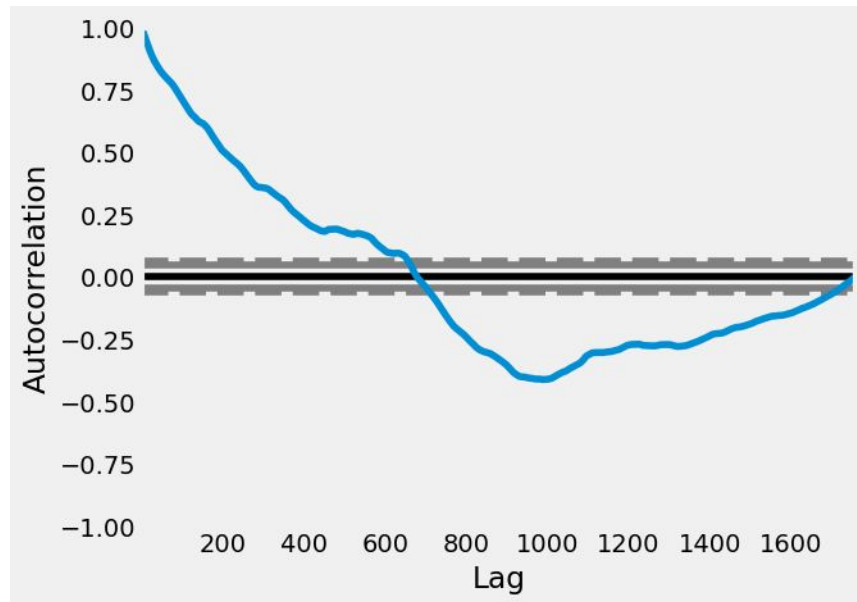
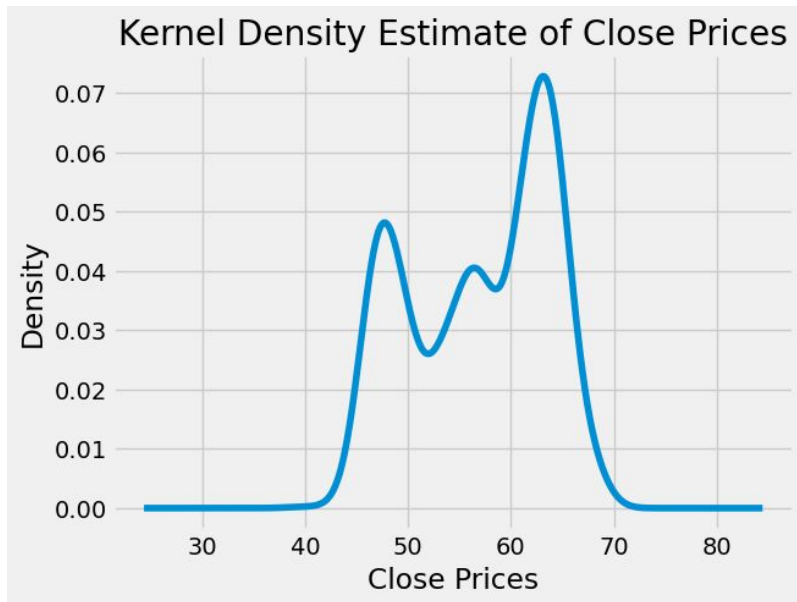
Because stock prices are only recorded when markets are open, this data only include business days.

SPLV Visualized



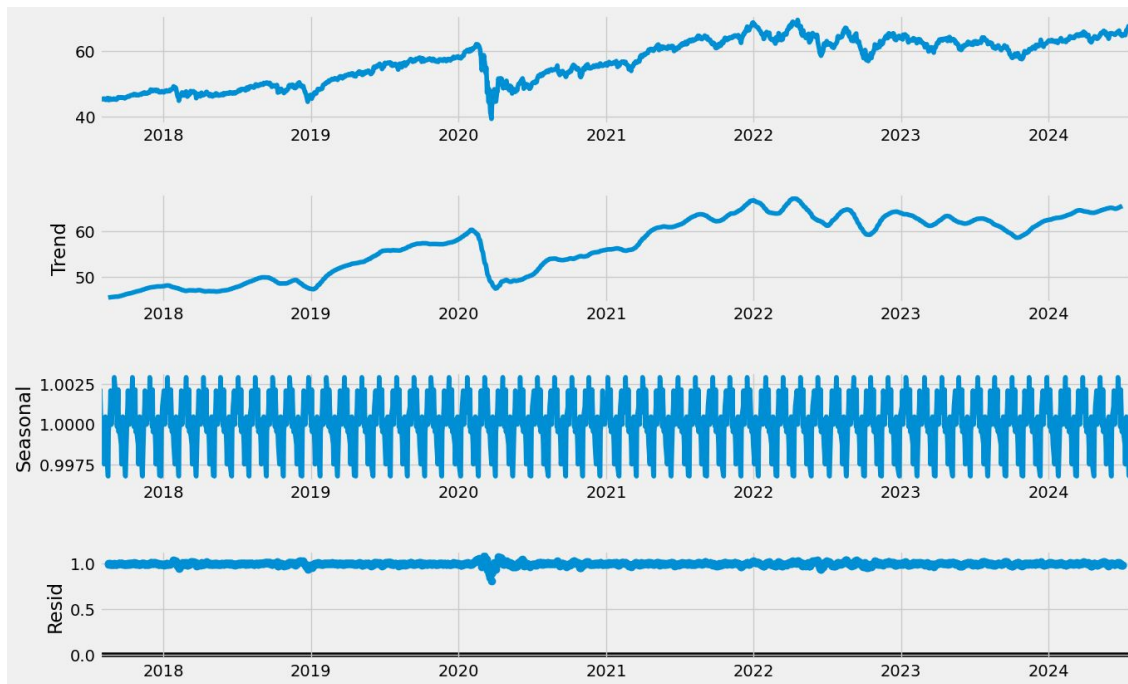


EDA

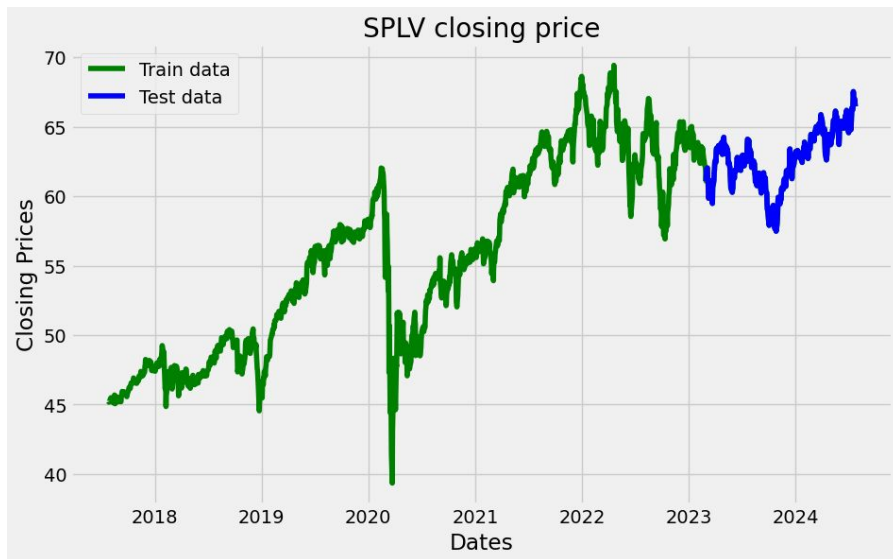




EDA cont.



Preprocessing



We applied the train/test split on our data at 80/20 split.



ADF Testing

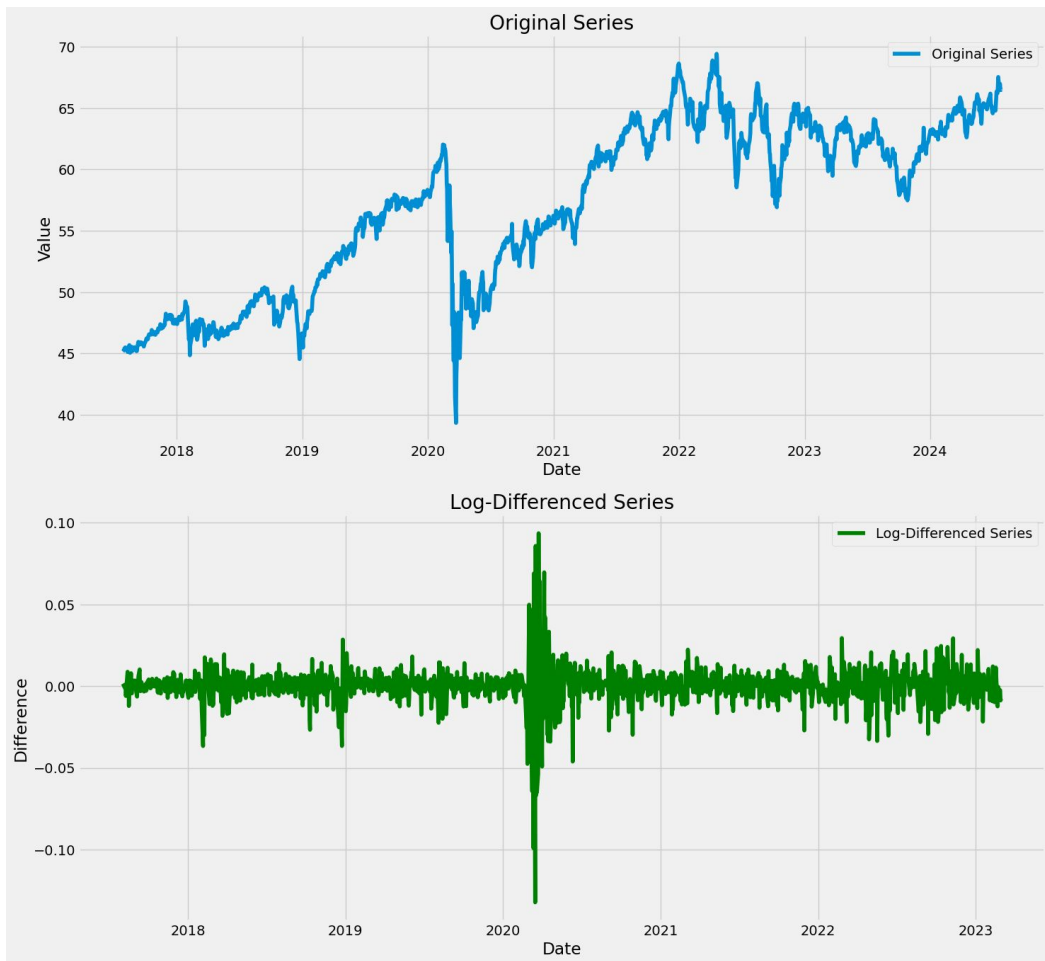
Testing for Stationarity is important, our dataset produced:

```
ADF Statistic (Differenced Series): -1.916121722432605  
p-value (Differenced Series): 0.32451536373038314
```

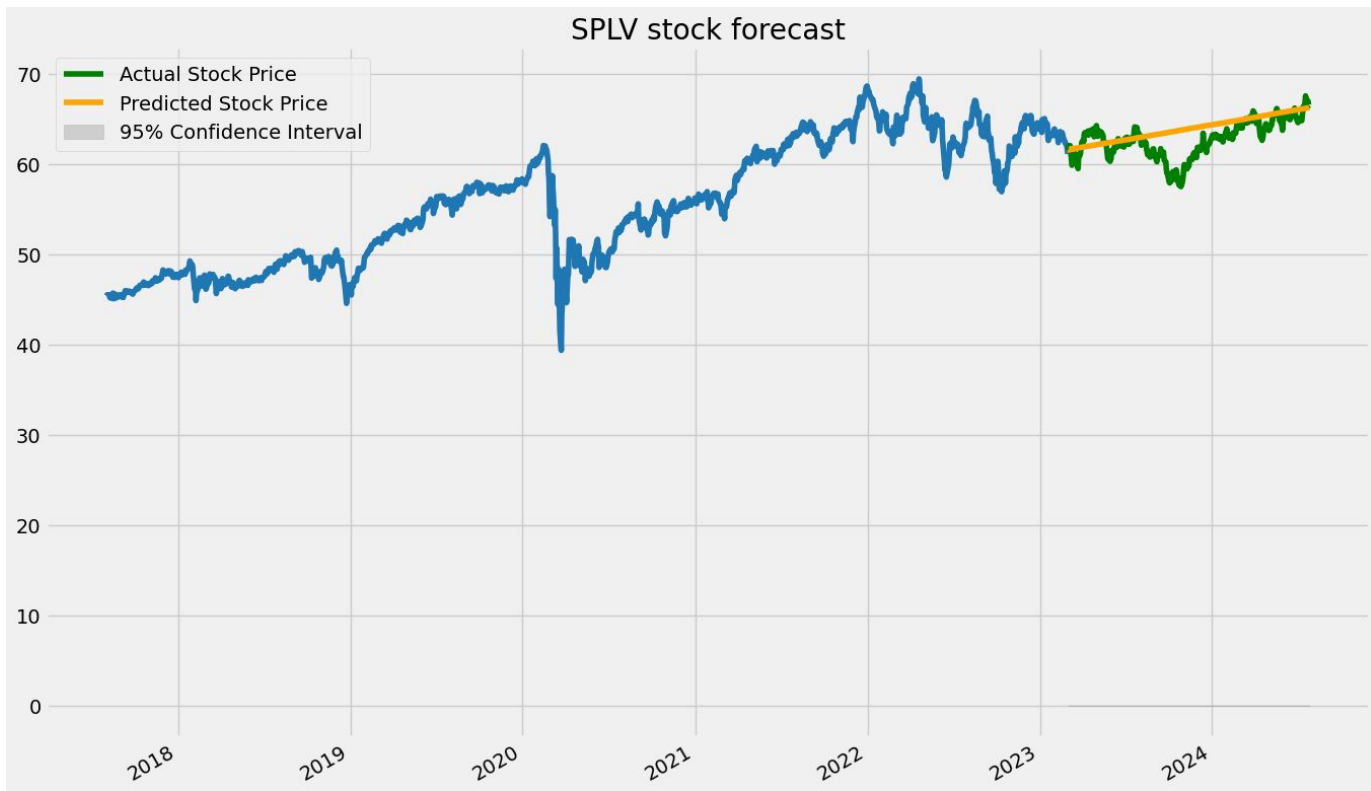
The p-value is greater than 0.05, thus our time series is non-stationary. To fix this we applied differencing

```
ADF Statistic (Differenced Series): -11.046514803125254  
p-value (Differenced Series): 5.2067285389968135e-20
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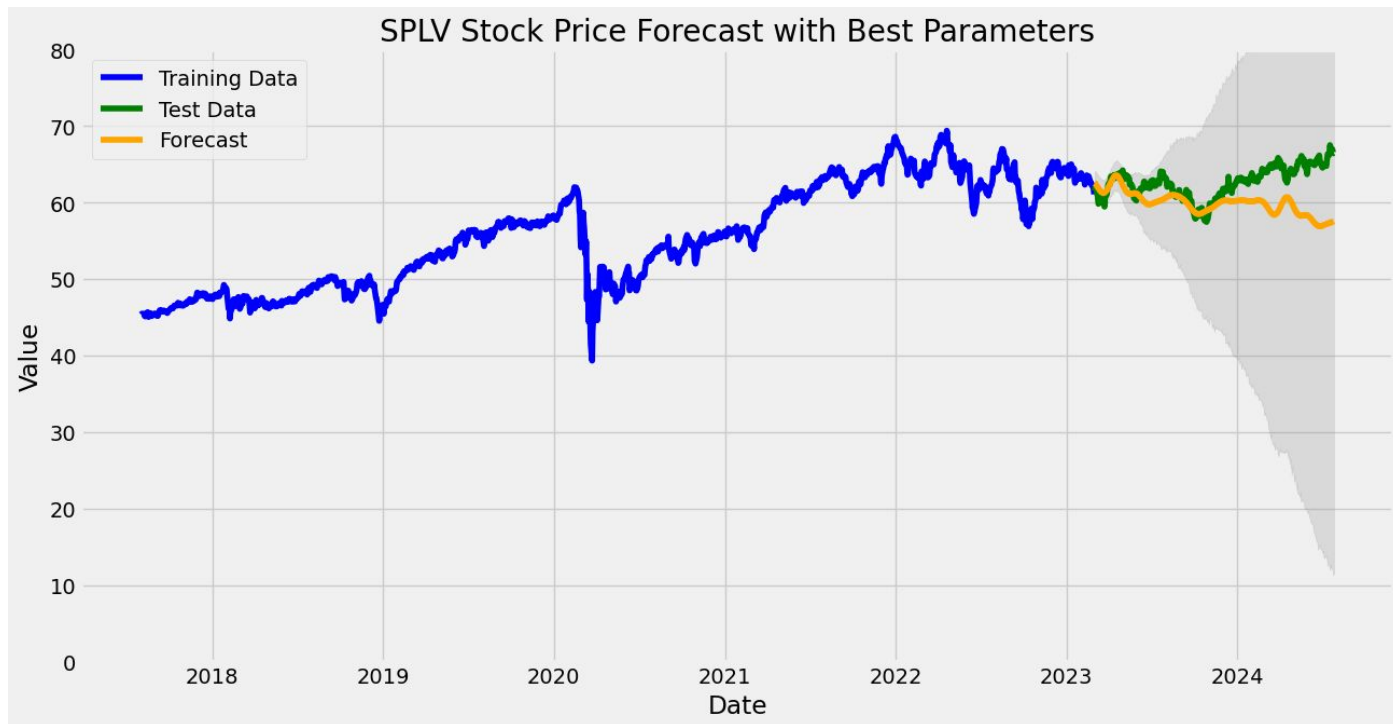
Once differencing was applied, our p-value is lower than 0.05, making our time series stationary.



Modeling - ARIMA



Modeling - Prophet





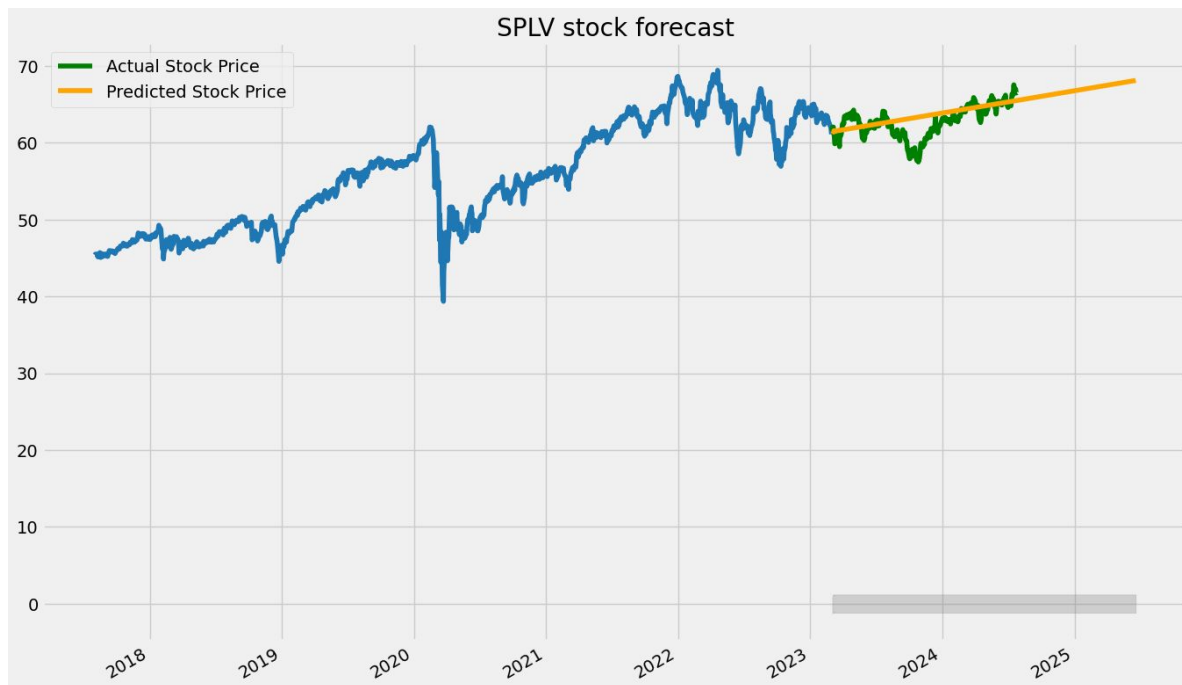
Evaluation

	Metric	Prophet	ARIMA
0	MSE	14.090119	4.287156
1	MAE	2.773540	1.550832
2	RMSE	3.753681	2.070545
3	MAPE	0.043234	0.024767

The ARIMA model demonstrated superior performance, accurately capturing the observed upward trend and achieving better accuracy across the chosen metrics.



Forecast





Conclusion

ARIMA Model Performance:

- Accurately captured the upward trend in SPLV data.
- Outperformed other model in accuracy metrics.

Project Insights:

- Importance of choosing the right model and evaluation metrics.
- Effective for stock prediction and future trading decisions.

Key Takeaways:

- Highlighted the need for appropriate data transformations.
- Showcased the value of careful model evaluation.