In [ ]:

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.dates as mdates
import os
import seaborn as sns
%matplotlib inline
import statsmodels.api as sm
from statsmodels.tsa.seasonal import seasonal_decompose
from statsmodels.tsa.arima.model import ARIMA
from statsmodels.tsa.statespace.sarimax import SARIMAX
from pmdarima import auto_arima
from statsmodels.graphics.tsaplots import plot_acf , plot_pacf
from pandas.plotting import autocorrelation_plot
from statsmodels.tsa.stattools import adfuller
from math import sqrt
from sklearn import preprocessing
from sklearn.metrics import r2_score , mean_absolute_error , mean_absolut
from sklearn.preprocessing import StandardScaler
from sklearn.svm import SVR
from sklearn.model_selection import train_test_split
from sklearn.model_selection import GridSearchCV
import pickle
import warnings
warnings.filterwarnings('ignore')
import os
```

In [ ]:

```python
os.chdir('C:\\Users\\santa\\OneDrive\\Documents\\KMUTT-4\\Final_PJ\\Data'
data = pd.read_csv('Merged Data.csv')
data.head()
```

Out[ ]:

	Date	Value	Policy rate
0	2005-02-28	38.459500	2.00
1	2005-03-31	38.556522	2.25
2	2005-04-30	39.515952	2.25
3	2005-05-31	39.762045	2.25
4	2005-06-30	40.886818	2.50

In [ ]:

```python
X = pd.to_datetime(data['Date']).astype('int64').values.reshape(-1, 1)
policy_rate = data['Policy rate'].values.reshape(-1, 1)
X = np.concatenate((X, policy_rate), axis=1)  # เพิ่ม Policy rate เข้าไปใน fe
y = data['Value']
```

In [ ]:

```python
# แบ่งข้อมูลเป็นชุดฝึกและชุดทดสอบ
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
```

In [ ]:

```python
# ทำการสเกลข้อมูล
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

In [ ]:

```
# ฝึกโมเดล SVR
svr_model = SVR(kernel='rbf', C=100, gamma='auto')  # ตั้งค่าพารามิเตอร์ของ SVR
svr_model.fit(X_train_scaled, y_train)
```

Out[ ]:

```
▾ SVR
SVR(C=100, gamma='auto')
```

In [ ]:

```
predictions = []

for i in range(3):
    # นับเวลา i เดือนหลังจากเดือนปัจจุบัน
    next_month = pd.to_datetime('2024-06-01') + pd.DateOffset(months=i)
    next_month = np.array([[next_month.timestamp()]])  # แปลงให้มีรูปแบบเหมือ

    # หาค่าเฉลี่ยของอัตราการเปลี่ยนแปลงของอัตราดอกเบี้ย
    your_policy_rate_value = data['Policy rate'].diff().mean()

    # ระบุค่า Policy rate ของเดือนถัดไป
    next_month_policy_rate = np.array([[your_policy_rate_value]])

    # ทำการสเกลข้อมูล
    next_month_combined = np.concatenate((next_month, next_month_policy_ra
    next_month_scaled = scaler.transform(next_month_combined)

    # ทำการทำนาย
    next_month_prediction = svr_model.predict(next_month_scaled)
    predictions.append(next_month_prediction)

print("Predictions for the next 3 months:", predictions)
```

```
Predictions for the next 3 months: [array([39.02444895]), array([39.024448
95]), array([39.02444895])]
```

In [ ]:

```
y_pred = svr_model.predict(X_test_scaled)
```

In [ ]:

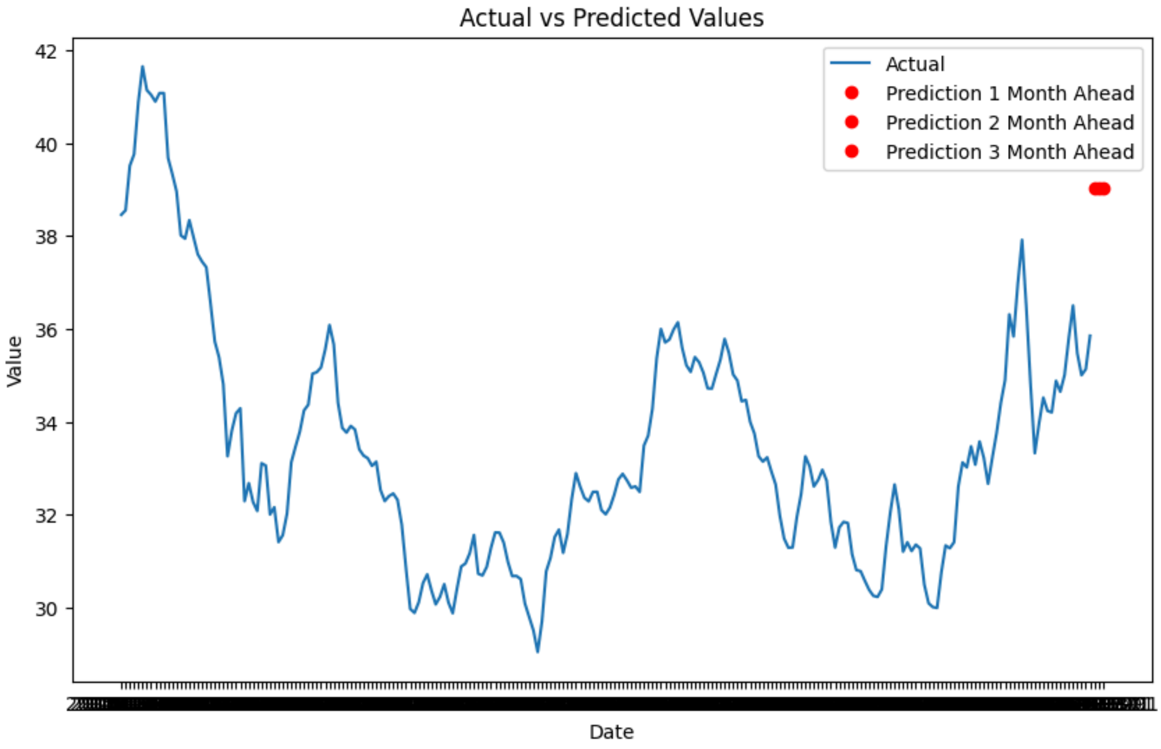
```
print('Evaluation Result for Test data : ','\n')
print('R2 Score for Test data: {0:.2f} %'.format(100*r2_score(y_test, y_p
print('Mean Squared Error: ', mean_squared_error(y_test, y_pred),'\n')
print('Mean Absolute Error: ', mean_absolute_error(y_test, y_pred),'\n')
print('Root Mean Squared Error: ', sqrt(mean_squared_error(y_test, y_pred
print('Mean Absolute Percentage Error: {0:.2f} %'.format(100*mean_absolut
```

```
Evaluation Result for Test data :

R2 Score for Test data: 85.19 %

Mean Squared Error:  0.9383592044501432

Mean Absolute Error:  0.65347413433745

Root Mean Squared Error:  0.9686894262095272

Mean Absolute Percentage Error: 1.95 %
```

In [ ]:

```
# พล็อตกราฟ
plt.figure(figsize=(10, 6))
plt.plot(data['Date'], data['Value'], label='Actual')  # พล็อตข้อมูลจริง
```

```
for i, prediction in enumerate(predictions):
    next_month_date = pd.to_datetime('2024-06-01') + pd.DateOffset(months
    next_month_date_str = next_month_date.strftime('%Y-%m-%d')  # แปลงเป็น
    plt.plot(next_month_date_str, prediction, 'ro', label=f'Prediction {i
plt.xlabel('Date')
plt.ylabel('Value')
plt.title('Actual vs Predicted Values')
plt.legend()
plt.savefig('Foreign Exchange Rate Prediction SVR.png')
plt.show()
```


Actual vs Predicted Values
Actual
Prediction 1 Month Ahead
Prediction 2 Month Ahead
Prediction 3 Month Ahead
Value
Date