GDP of Malaysia from 1960 to 2021 and Prediction for next 5 years

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1. Introduction

1. Gross domestic product (GDP) measures the monetary value of final goods and services produced in a country in a given period of time

1. GDP is important because it gives information about the size of the economy and how an economy is performing. The growth rate of real GDP is often used as an indicator of the general health of the economy.

1. Aim of this project is to analyze GDP of Malaysia and Predict to GDP for next 5 Years

1. To predict the GDP, I used ARIMA model

2. Dataset

Dataset: Gross domestic product of Malaysia in USD

Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=MY

1. Given Dataset contain data of GDP of Malaysia from 1960 to 2021
2. Dataset size: 2 columns X 62

3. Malaysia GDP

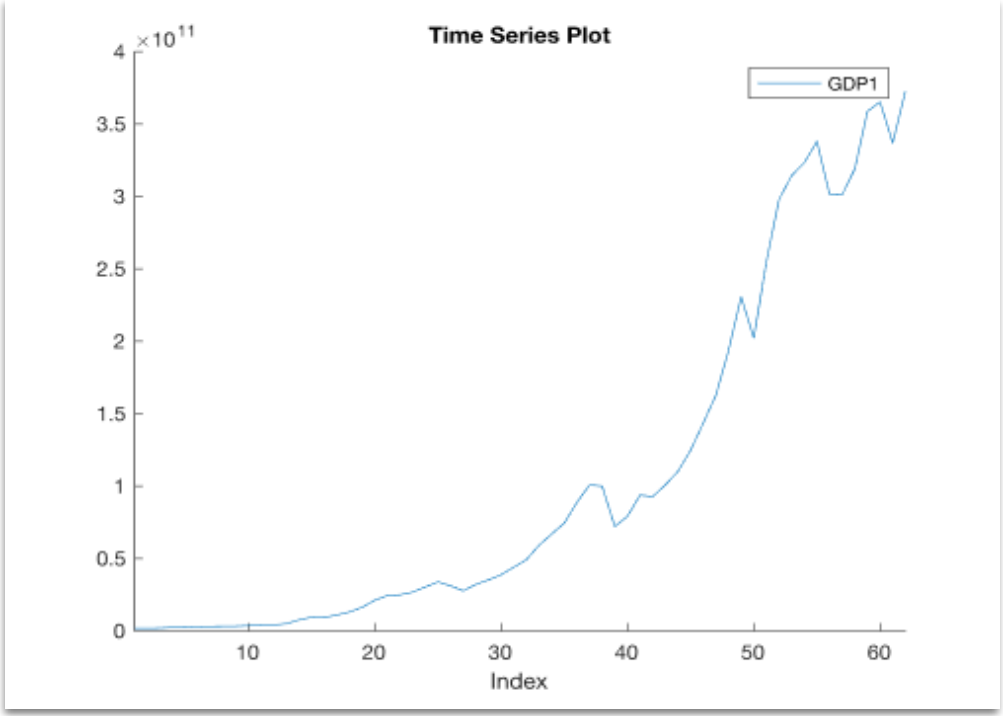
- Strategically located in Southeast Asia with a stable economy, Malaysia is well-positioned to be a hub for international business.
- The country is also home to a growing consumer base with increasing purchasing power and is one o the largest economies in the Association of Southeast Asian Nations (ASEAN)
- Gross domestic product (GDP) grew at its fastest pace since the second quarter of 2021 in the July-September period. Economists had expected GDP to rise 11.7%.

Prediction using the ARIMA model

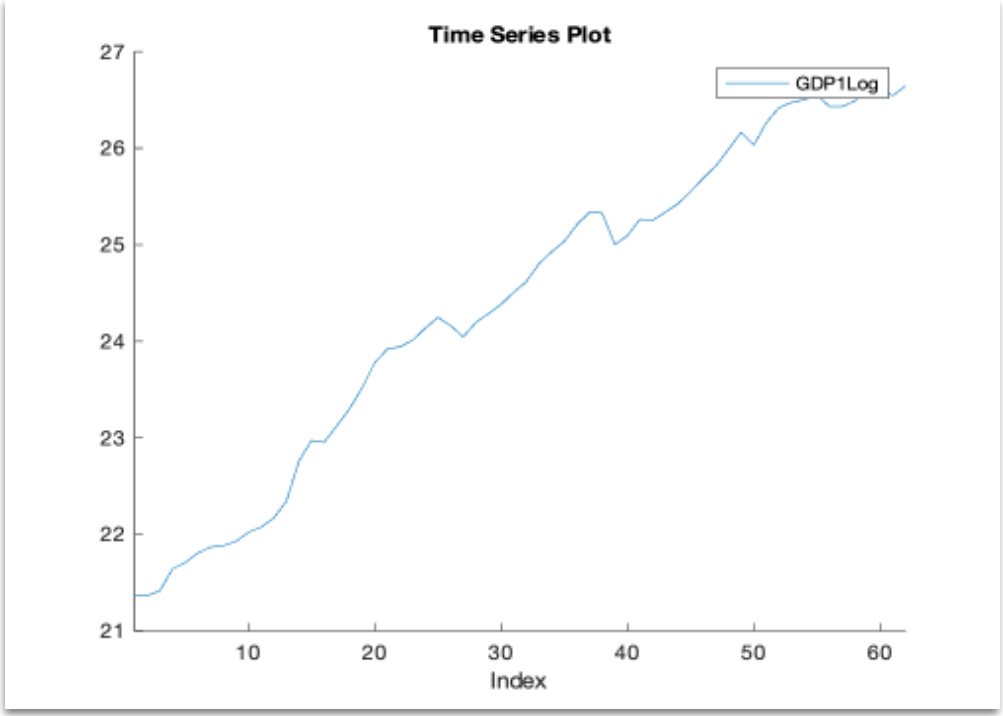
Steps

1. Visualize the Time Series Data.
2. Identify if the date is stationary.
3. Plot the Correlation and Autocorrelation Charts.
4. Construct the ARIMA Model based on the data.

4. Time Series Plot



Log of GDP


Time Series Plot
GDP1Log
27
26
25
24
23
22
21
10
20
30
40
50
60
Index

Time Series: GDPLogDiff

Time series GDPLogDiff is the first-order difference of time series GDPLog.

Augmented Dickey-Fuller Test

Null Hypothesis: GDPLogDiff contains a unit root

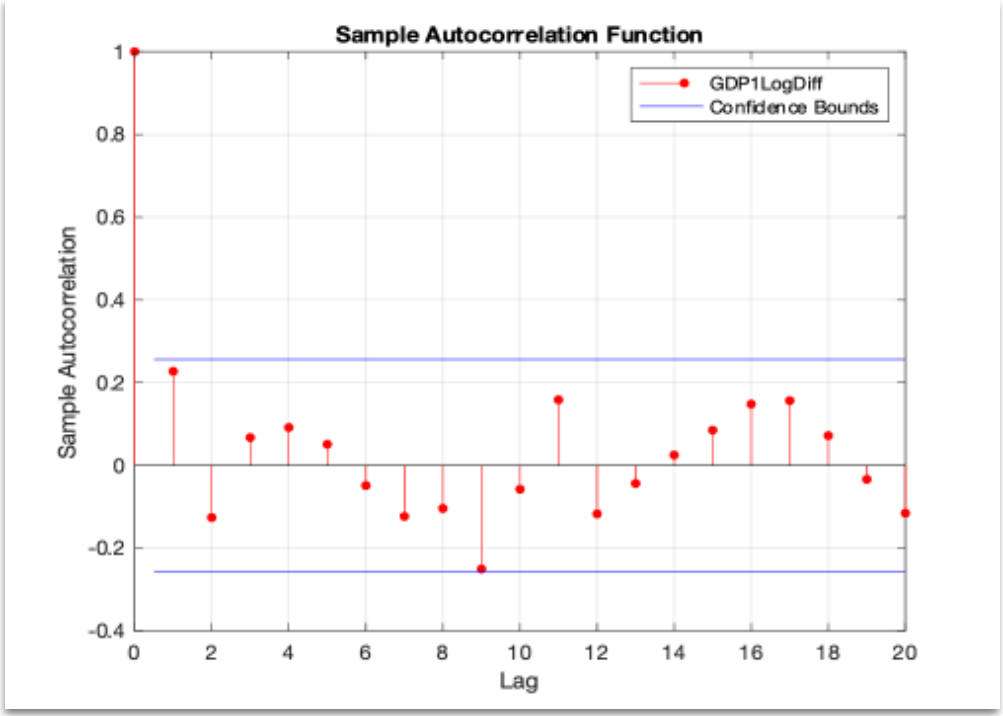
Table 0.1. Test Parameter Results

	Lags	Model	Test Statistic	Significance Level
1	0	AR	t1	0.05

Table 0.2. Test

	Null Rejected	P-Value	Test Statistic	Critical Value
1	true	0.001	-4.2638	-1.9458

5. Autocorrelation Function



6. ARIMA(1,1,1) Model

Autoregressive integrated moving average model of time series GDP1 with the following equation:

$$(1-\phi_1 L)(1-L)y_t = c + (1+\theta_1 L)\varepsilon_t$$

1.1. Model Estimation

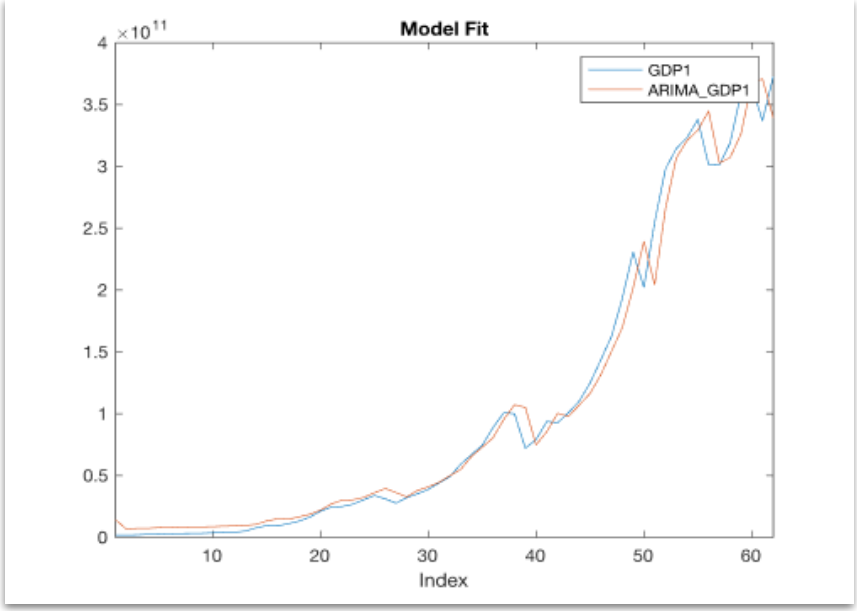
Table 1.1. Estimation Results

Parameter	Value	Standard Error	t Statistic	P-Value
Constant	6078444538.0928	8.4143e-11	7.223917981610452e+19	0
AR{1}	-0.036876	0.32106	-0.11486	0.90856
MA{1}	0.13443	0.31717	0.42386	0.67167
Variance	2.343466697326245e+20	6.5992e-22	3.5511425364656e+41	0

Table 1.2. Goodness of Fit

AIC	3091.4495
BIC	3099.8268

ARIMA GDP


Model Fit
×10^11
4
3.5
3
2.5
2
1.5
1
0.5
0
10
20
30
40
50
60
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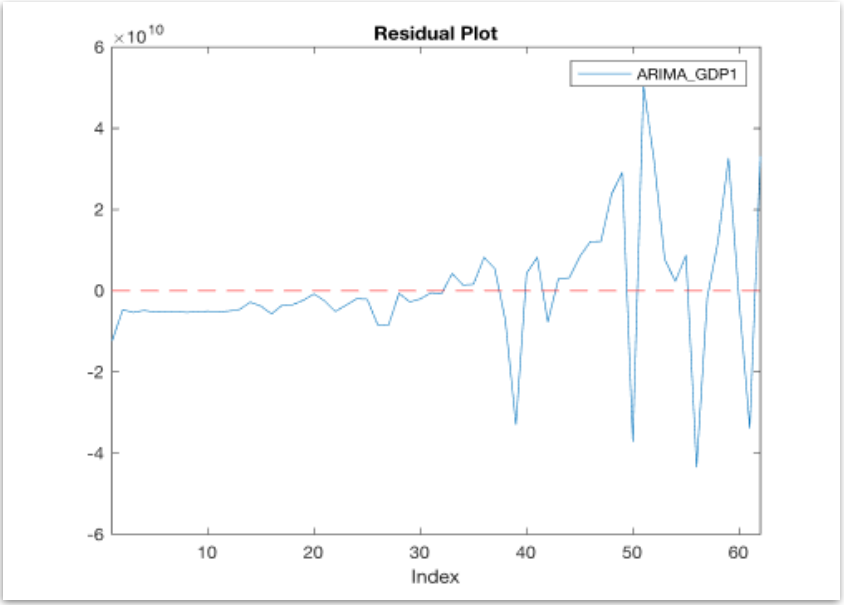
GDP1
ARIMA_GDP1


Residual Plot
×10^10
6
4
2
0
-2
-4
-6
10
20
30
40
50
60
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ARIMA_GDP1

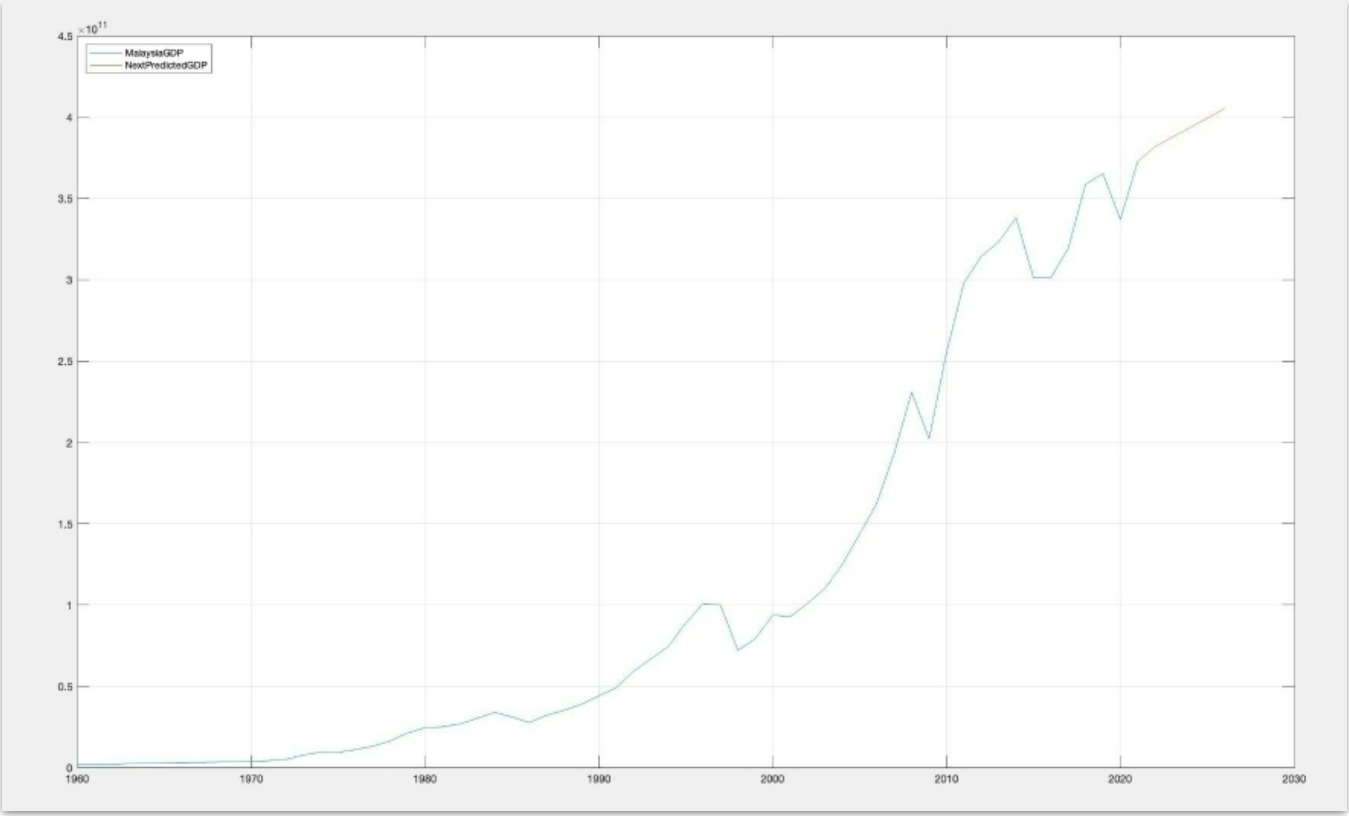
7. Predictions for next 5 years

Addition of 5 Years and Prediction

```
ARIMA_GDP_Prediction_Next5Years = forecast(ARIMA_GDP,5,'Y0',GDP);
Add5Years = year(end):1:year(end)+5
```

```
Add5Years =

       2021.00       2022.00       2023.00       2024.00       2025.00       2026.00

>> ARIMA_GDP_Prediction_Next5Years = [GDP(end);ARIMA_GDP_Prediction_Next5Years]

ARIMA_GDP_Prediction_Next5Years =

 372701358820.26
 381915204837.51
 387653879327.06
 393520704340.99
 399382803672.53
 405245077268.46
```

Prediction Graph



Pros and Cons of using ARIMA models

Pros of using ARIMA models

- Only requires the prior data of a time series to generalize the forecast.
- Performs well on short-term forecasts.
- Models non-stationary time series.

Cons of using ARIMA models

- Difficult to predict turning points.
- There is quite a bit of subjectivity involved in determining (p,d,q) order of the model.
- Computationally expensive.
- Poorer performance for long-term forecasts.
- Cannot be used for seasonal time series.

8. Conclusion

- The ARIMA methodology is a statistical method for analyzing and building a forecasting model which best represents a time series by modeling the correlations in the data.
- ARIMA models only need the historical data of a time series to generalize the forecast and manage to increase prediction accuracy.
- ARIMA models can be easily and accurately used for short-term forecasting with just the time series data, but it can take some experience and experimentation to find an optimal set of parameters for each use case.

Thank you