

THE IMPACT OF PANDEMIC COVID-19 TO EXCHANGE RATE OF RUPIAH TO OTHER COUNTRIES

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Background

- Covid-19 has had an impact in various fields of human life, such as social, education, industry, government, and socio-economy, etc
- In the economic sector, the exchange rate is an indicator of the economic stability of a country
- The government has a policy to control the exchange rate
- The government is also making efforts to control Covid-19
- In fact, many countries have not succeeded in dealing with Covid-19.
- Is the exchange rate of a country affected by the addition of positive cases of Covid-19?

Background

- Prediction of future exchange rates is important in policy making.
- How to predict exchange rates using the VAR, CNN, and LSTM methods?
- In the time series, the vector autoregressive method is used for forecasting multiple time series data.
- whereas in machine learning, CNN and LSTM have characteristics similar to VAR

Goal

- Knowing the effect of the number of daily positive confirmed cases on the exchange rate
- Modeling the exchange rate of the rupiah against several countries' currency values that have a similar case to Indonesia
- Determine the best model
- Predicting the exchange rate of the IDR against the currencies of several countries that have similar cases to Indonesia

Research Method

1. Preparing Data
 - Getting data,
 - Screening data,
 - Data Exploration
2. Test ganger causality among series
3. Co-integration test
4. Divide the data into training and testing set
5. Modeling the data using VAR, CNN, and LSTM method
6. Compute and Compare the model performance using MAPE, RMSE, and R-squared.
7. Predict the future data using the best model.
8. Discussion

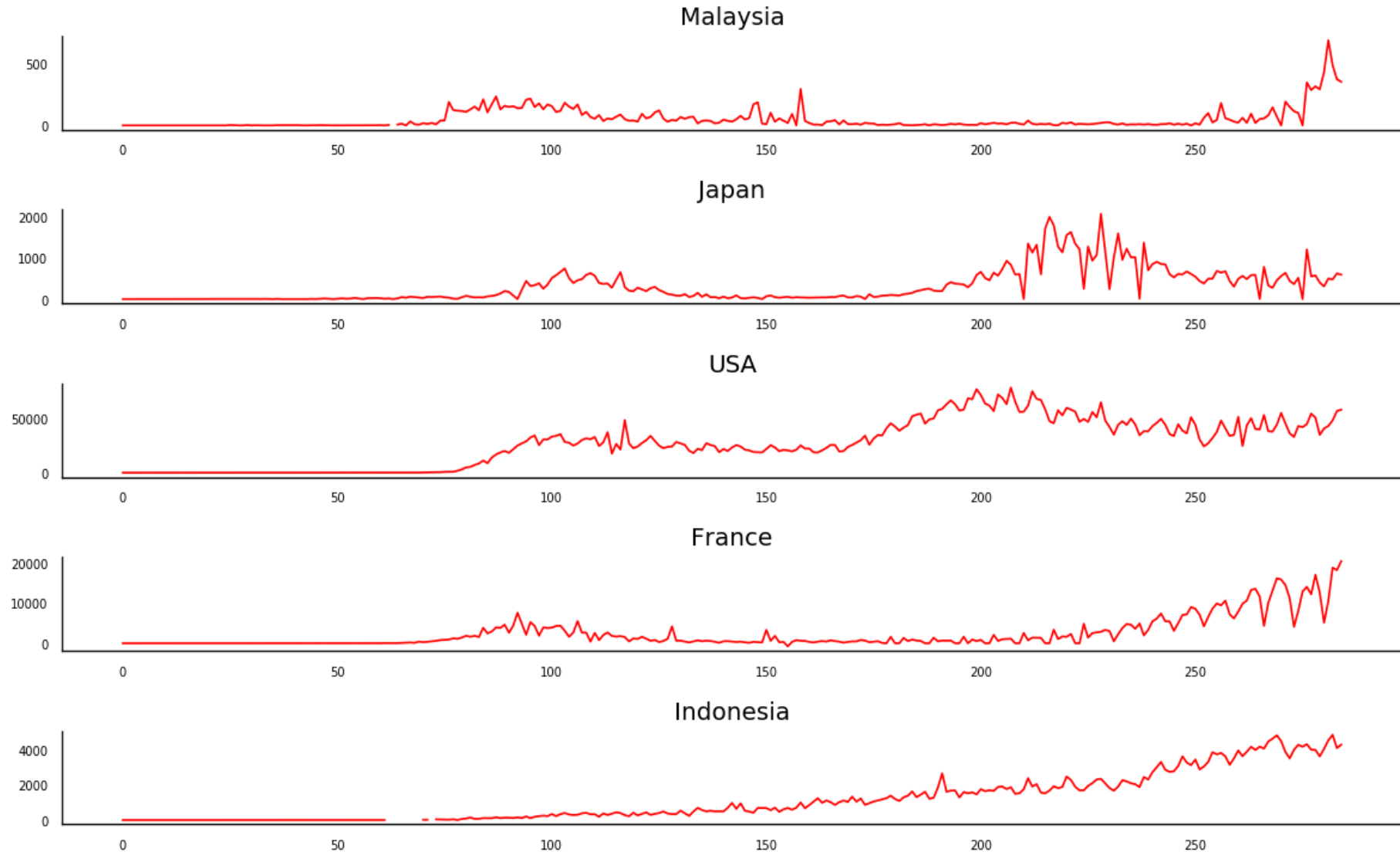
Data Description

- The number of daily new cases confirmed positive for Covid in a country, and
- The exchange rate of the IDR against related countries

Countries

- Indonesia (Asia - Rupiah)
- Malaysia (Asia - Ringgit)
- Japan (Asia – Yen)
- US (North America – Dollar America)
- France (Europe – Euro)

Curve of new confirmed positive covid_19 daily



The 5 last observed values of confirmed covid_19

Rec.	Malay	Japan	USA	France	Indonesia
280	432.0	308.0	40705.0	5104.0	4056.0
281	691.0	496.0	43062.0	10489.0	4538.0
282	489.0	477.0	48182.0	18746.0	4850.0
283	375.0	619.0	56800.0	18129.0	4094.0
284	354.0	594.0	58082.0	20339.0	4294.0

Plot of some currencies to IDR

USD to IDR



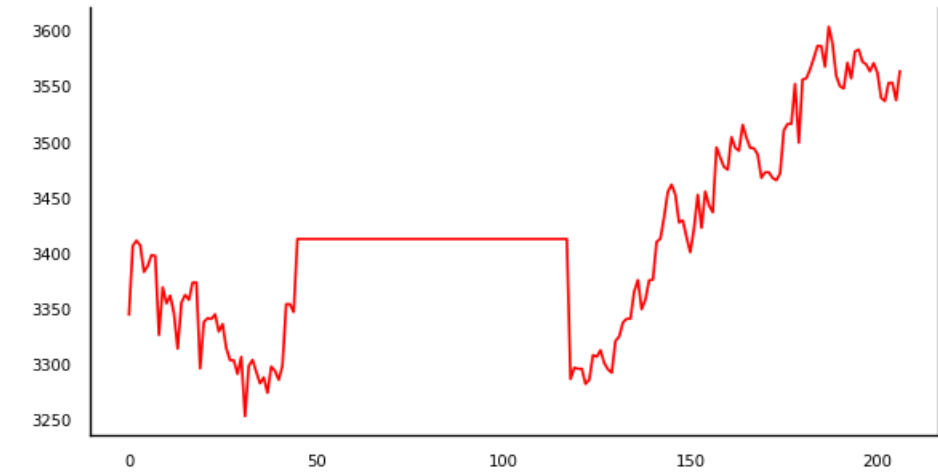
EURO to IDR



JPY to IDR



MYR to IDR



The 5 last observed values of exchange rate to IDR

Rec	USD to IDR	EURO to IDR	J P Y to IDR	MYR to IDR
202	14759.200195	17268.000000	138.656006	3536.060059
203	14751.500000	17120.199219	139.100006	3552.419922
204	14787.799805	17350.000000	140.089005	3552.560059
205	14790.000000	17225.000000	139.472000	3536.820068
206	14775.000000	17356.000000	140.399994	3562.800049

Granger Causality

- Granger causality is a way to investigate **causality** between two variables in a time series.

Running the test:

1. State the null hypothesis and alternate hypothesis. For example, $y(t)$ does not Granger-cause $x(t)$
2. Choose the lags.
3. Find the f-value. Two equations can be used to find if $\beta_j = 0$ for all lags j :

$$y(t) = \sum \alpha_i y(t - i) + c_1 + v_1(t)$$
$$y(t) = \sum \alpha_i y(t - i) + \sum \beta_j x(t - j) + c_2 + v_2(t)$$

4. Calculate F-statistics
5. Reject the null if the F statistic (Step 4) is greater than the f-value (Step 3).

Co-integration Test

- Cointegration tests analyze non-stationary time series— processes that have variances and means that vary over time. Tests for cointegration identify stable, long-run relationships between sets of variables.
- Three of the most popular tests are:
 1. Engle–Granger
 2. Phillips–Ouliaris
 3. Johansen test
- The null hypothesis:
 H_0 : No cointegration exists
 H_1 : Cointegration exists

Cross Correlation Function (CCF)

- CCF is need to determine the initial structure model on the multivariate time series analyses such as Vector Autoregressive (VAR) model
- CCF can evaluated the relationship between 2 rime series.
- The possible relationships are
 - A. two series are independently each to other
 - B. 2 series have one direction relationship
 - C. two series have bi-direction relationship

MODELING VAR, LSTM, RNN, CNN

- Include model building, model testing, and use model for predicting of future values
- Model building uses training data which some scenario in setting parameter and hyper-parameter model
- use testing data to measure model performance on the MAPE, RMSE and R_squared criteria.

Thank you
for the attention

Any suggestion ?