Prediction of Russian ruble (RUB) against US dollar (USD) in June 2022 amid Russian-Ukrainian war

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Introduction

The Russian ruble hit its lowest of 158 rubles against 1 dollar following the military invasion of Russia to Ukraine on February 24th, 2022 (McCabe, 2022.)

Later, it became the best performing currency on May 23rd, increasing its value by 30% in a year as a result of:

- government regulations of internal and external economy
- oil price increase due to worldwide shortage (McCabe, 2022.)

This exploration evaluates the significance of oil price in predicting the USD/RUB rate and predicts its average in June 2022.

This exploration includes datasets of daily, monthly, and irregular intervals compiled from government and non-government corporations' open access databases.

Methodology

USD/RUB and USD/EUR exchange rates, interest rates of the Russian financial market, oil price, and inflation rate are effective predictors of USD/RUB exchange rate (Kim, 2018) and were used in this study.

Exploratory data analysis showed that after the devaluation of the ruble followed by Russia's first invasion of Ukraine in February 2014, the rate of change of USD/RUB only stabilized in early 2018 (Fig1.)
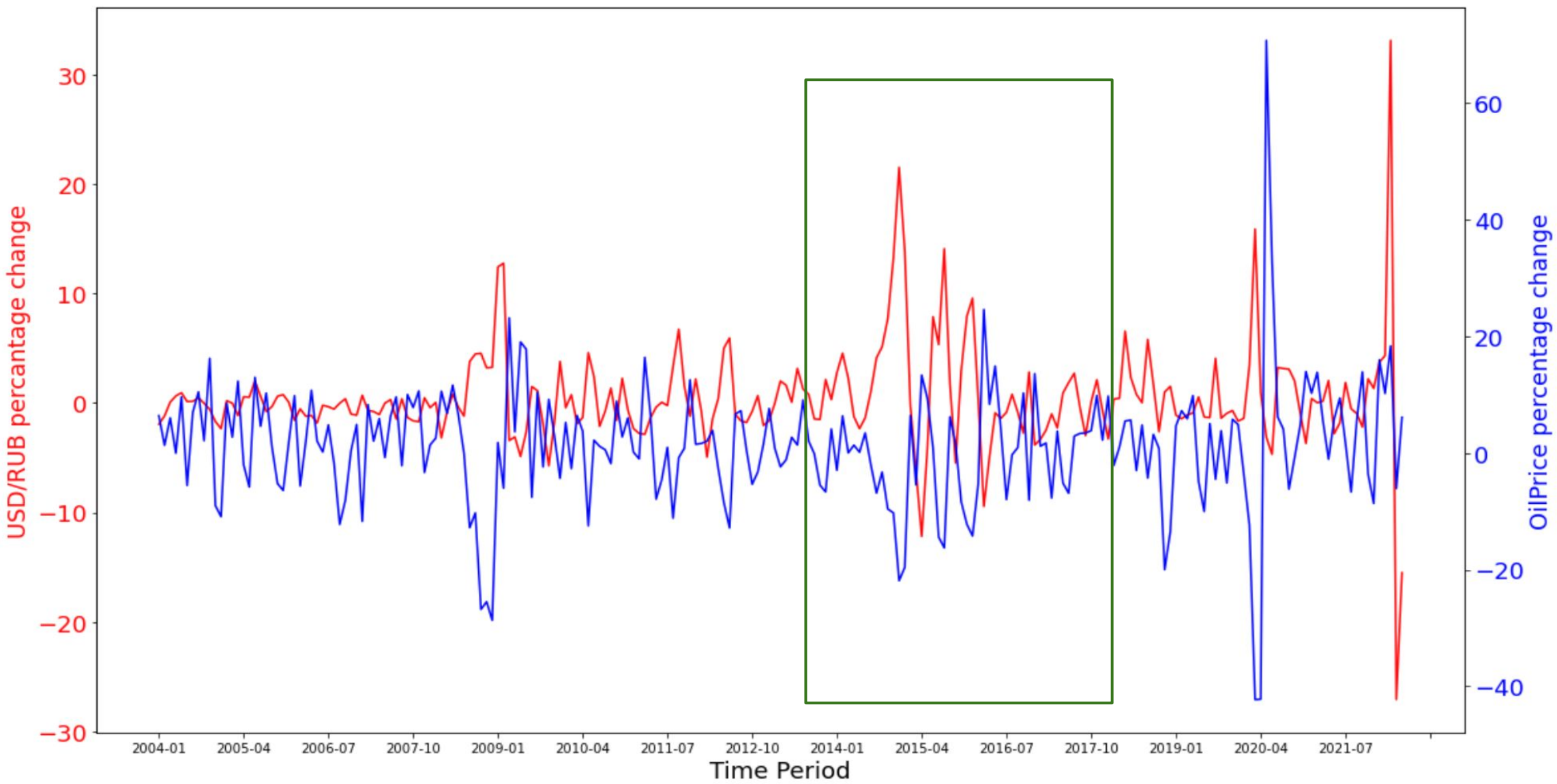

Figure 1: Percent Change Oil Price and Percent Change in Ruble Price vs Time (2004-2022)

Data was split from 12-2003 to 02-2018 and from 03-2018 to 05-2022 for training and testing sets respectively (77/23 ratio.) Linear Regression & Keras Deep Learning models were built using different features combinations.

Analysis

Six (three Linear Regression and three Deep Learning) models were selected for comparative analysis. Each type of model was trained with the following set of features:
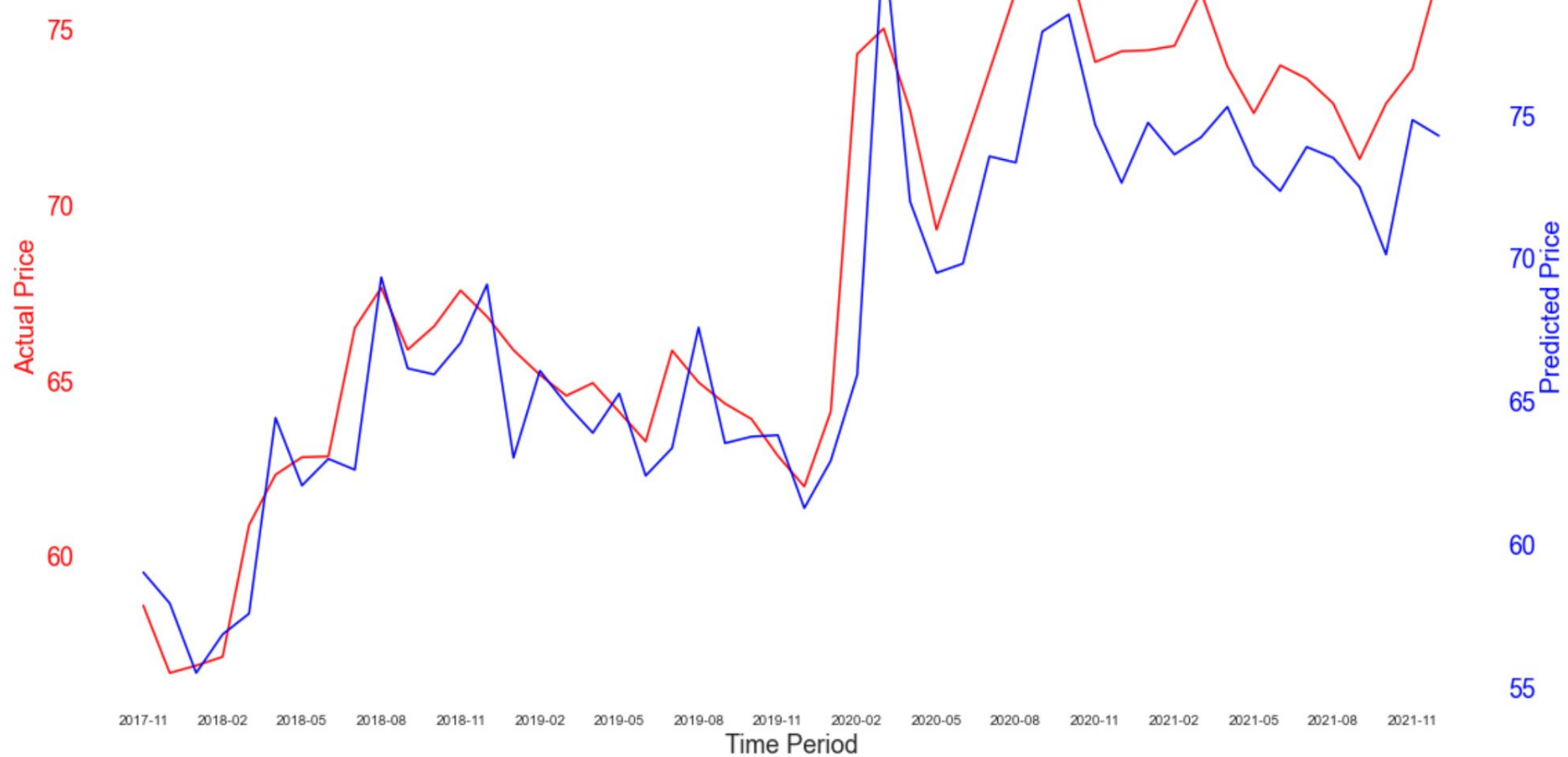

Figure 2: Linear model trained with USD/RUB_Open, USD/RUB_High, USD/RUB_Low, USD/RUB_Close, Oil Price.
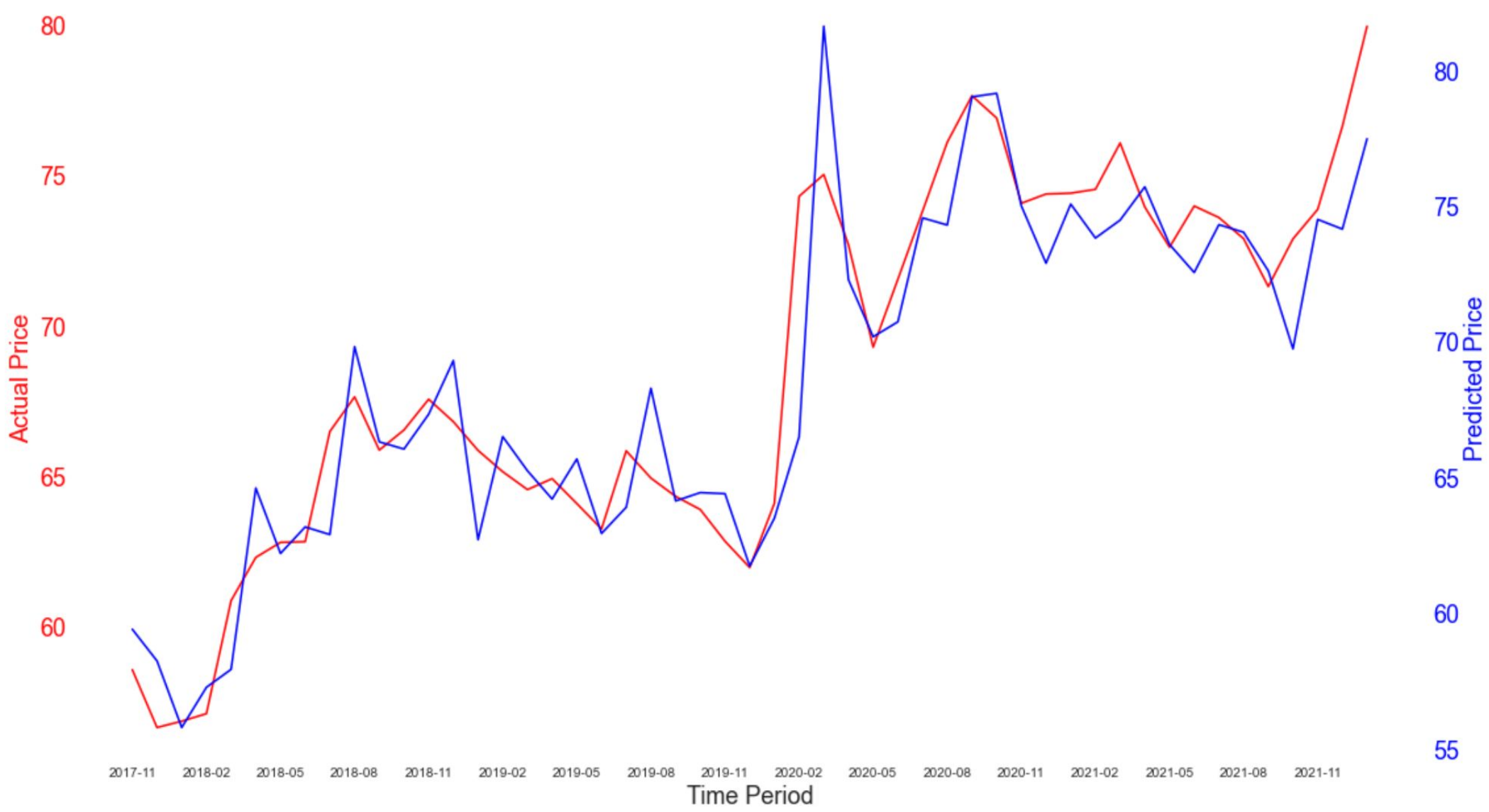

Figure 3: Linear model trained with USD/RUB_Open, USD/RUB_High, USD/RUB_Low, USD/RUB_Close, Oil Price, Inflation rate, Overnight interest rate
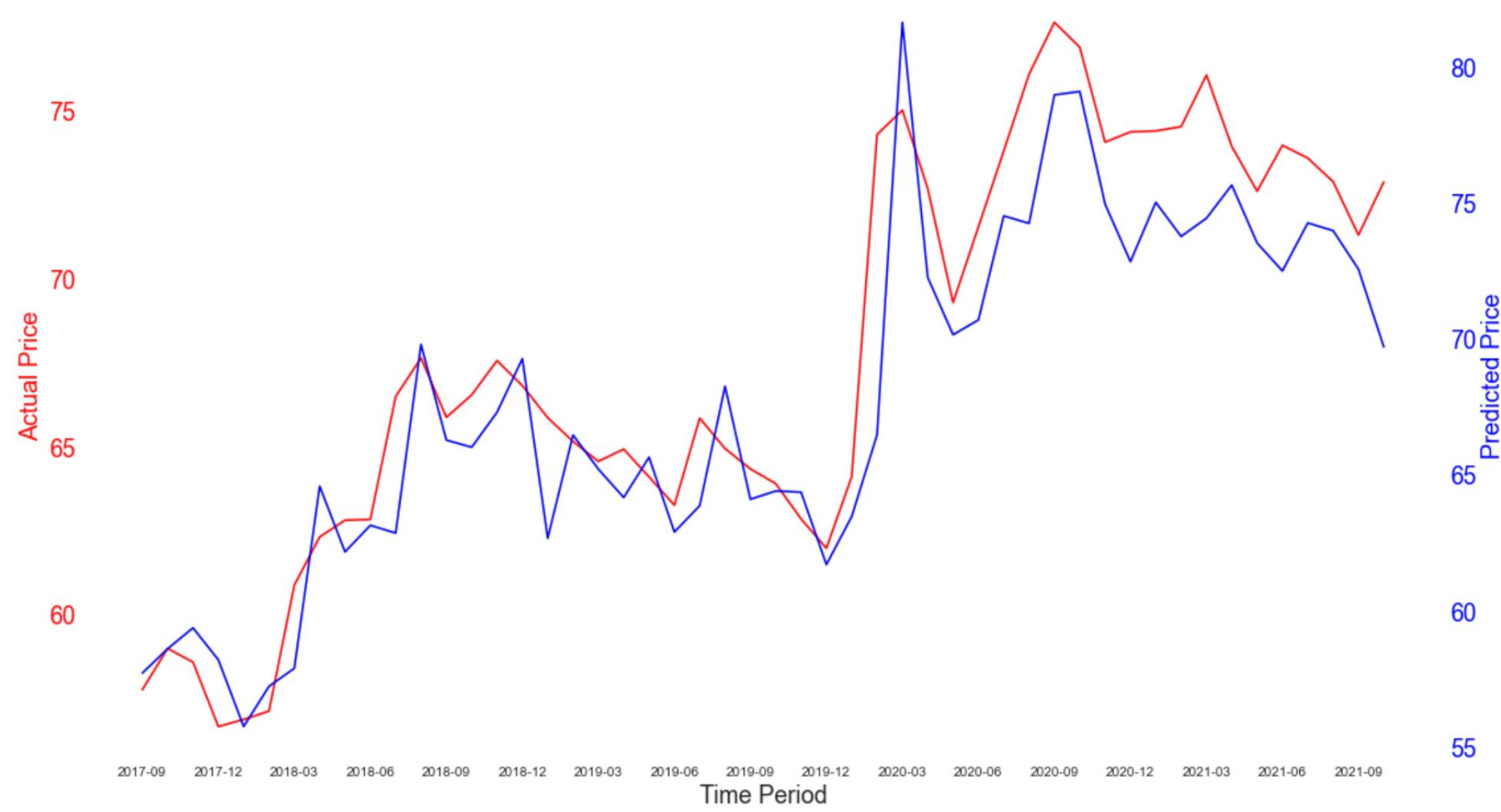

Figure 4: Linear model trained with USD/RUB_Open, USD/RUB_High, USD/RUB_Low, USD/RUB_Close, EUR/RUB_Open, EUR/RUB_High, EUR/RUB_Low, EUR/RUB_Close, Oil Price, Inflation rate, Overnight interest rate

Since confident level of all six models have a very similar range, mean absolute percentage error played a major role in choosing the linear model with only four variables of USD/RUB exchange rate and Oil Price.

Type	N	Features	Mean absolute percentage error	USD/RUB predicted value	Confidence interval 95%
Linear	1	4USD, Oil_price	2.155	54.307	51.533 – 57.082
	2	4USD, Oil_price, Inflation, Overnight_int	2.393	53.590	50.883 – 56.296
	3	4USD, 4EUR, Oil_price, Inflation, Overnight_int	2.250	51.579	48.897 – 54.261
Deep Learning	4	4USD, Oil_price	3.226	61.996	57.334 – 66.658
	5	4USD, Oil_price, Inflation, Overnight_int	3.054	70.565	66.991 – 74.139
	6	4USD, 4EUR, Oil_price, Inflation, Overnight_int	2.380	65.458	61.632 – 69.283

Figure 5: Comparison between Linear Regression and Deep Learning models built by using different combinations of features

Exploration confirms the findings of earlier studies that oil price is a significant factor in forecasting the USD/RUB value due to Russia's oil-dependent economy (Kim,2018). Using the two currency exchanges (USD/RUB and EUR/RUB) and one (USD/RUB) produces different results as currency included oil price factor. The effect of oil price was also confirmed by feature analysis of linear model.

The predicted value confirms the trend observed in the previous invasion, which caused a rapid devaluation of the Russian currency, followed by its rapid revaluation - the current state of the ruble.

Exploratory analysis is also reflected the effect of regulations of Russia as a response to Western sanctions, namely its strict selling of oil in the ruble (McCabe,2022), which resulted in a rapid strengthening of the currency, which is expected to be observed in June.

Conclusion

In June 2022, it is predicted that the USD/RUB exchange rate value will be 54.307, with 95% confidence that the value lies in the interval from 51.533 to 57.082, thus causing the further strengthening of the Russian ruble.

References

1. McCabe, C. (2022, May 25). Russia's Economy Is Tanking but the Ruble Soared. Here's Why. *The Wall Street Journal* .
2. Kim, Y. (2018). *The Determinants of the Foreign Exchange Rate in Russia* (thesis).