Effect of Election on Currency Fluctuation*

Analysis of USD Exchange Rate Fluctuation during Inaugurtion week

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First sentence. Second sentence. Third sentence. Fourth sentence.

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*Code and data are available at: https://github.com/Jingying-yu/election-season-and-currency-fluctuation.git

1 Introduction

You can and should cross-reference sections and sub-sections. We use R Core Team (2023) and Wickham et al. (2019).

The remainder of this paper is structured as follows. Section 2….

2 Data

2.1 Data on Exchange Rate

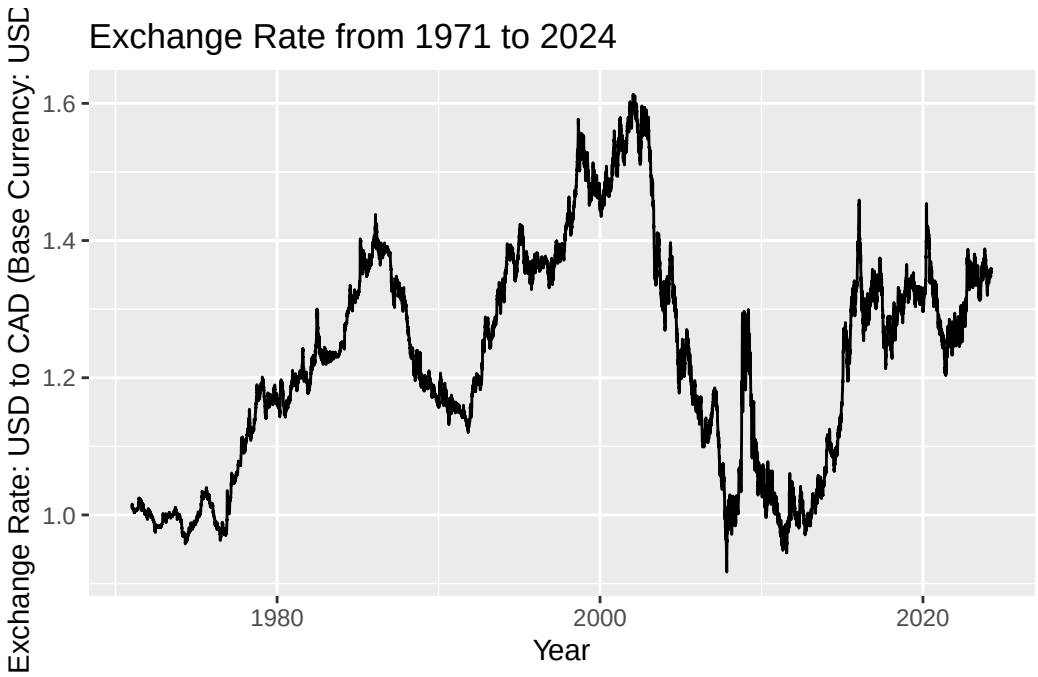


Figure 1: Exchange Rate from 1971 to 2024

2.2 Data on Election Results

2.2.1 Selection of Data Source

2.2.2 Construction of Inauguration Week

$$Day1 \quad Day2 \quad Day3 \quad Inauguration\ Day \quad Day5 \quad Day6 \quad Day7$$

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma)$$

$$\mu_i = \alpha + \beta_i + \omega_i$$

$$\alpha \sim \text{Normal}(0, 2.5)$$

$$\beta \sim \text{Normal}(0, 2.5)$$

$$\omega \sim \text{Normal}(0, 2.5)$$

$$\sigma \sim \text{Exponential}(1)$$

Where:

- y_i is the daily exchange rate of USD v.s. CAD (base unit is USD = 1)

Table 1: Explanatory models of flight time based on wing width and wing length

	Inauguration model
(Intercept)	1.23
	(0.00)
inauguration_period	−0.14
	(0.05)
change_party	0.18
	(0.06)
Num.Obs.	13 358
R2	0.001
Log.Lik.	5487.404

- β_i is a dummy variable (value is either 0 or 1) indicating whether the date is within the inauguration week (see data section for definition of inauguration week). If date is within the inauguration week, then the variable has a value of 1, and 0 otherwise.
- ω_i is a dummy variable indicating whether a change of political party occurred in the corresponding election season. Each inauguration week receives identical value (the whole week is either all 1 or all 0). Value of 1 indicates that the elected president's political party is different from last season's president's, 0 otherwise.

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular…

We can use maths by including latex between dollar signs, for instance θ.

4 Results

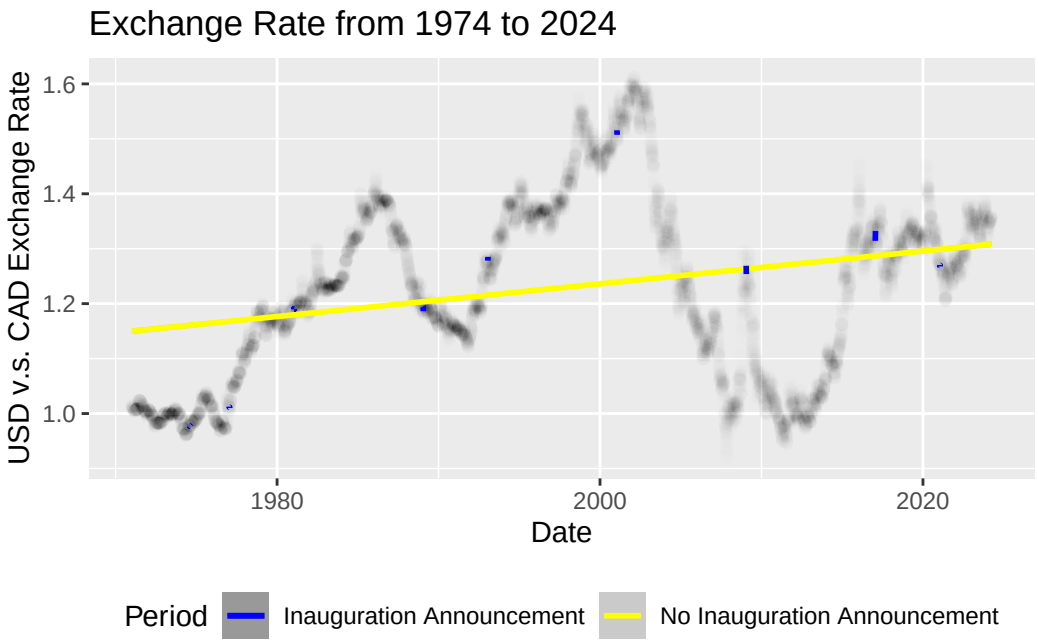
Our results are summarized in Table 1.

4.1 Explaination for small R^2

```
colors <- c("No Inauguration Announcement" = "yellow", "Inauguration Announcement" = "blue

exchange_inaug |>
  ggplot(aes(
    x = date,
    y = exchange_rate
  )) +
  geom_point(alpha = 0.005) +
  geom_smooth(
    data = exchange_inaug |> filter(inauguration_period == 0),
    method = "lm",
    aes(color = "No Inauguration Announcement"),
    formula = "y ~ x"
  ) +
  geom_smooth(
    data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1974-08-06" & date
    method = "lm",
    aes(color = "Inauguration Announcement"),
    formula = "y ~ x"
  ) +
  geom_smooth(
    data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1977-01-17" & date
    method = "lm",
    aes(color = "Inauguration Announcement"),
    formula = "y ~ x"
  ) +
  geom_smooth(
    data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1981-01-17" & date
    method = "lm",
    aes(color = "Inauguration Announcement"),
    formula = "y ~ x"
  ) +
  geom_smooth(
    data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1981-01-17" & date
    method = "lm",
    aes(color = "Inauguration Announcement"),
    formula = "y ~ x"
  ) +
  geom_smooth(
```

```
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1989-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) +
geom_smooth(
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "1993-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) +
geom_smooth(
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "2001-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) +
geom_smooth(
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "2009-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) +
geom_smooth(
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "2017-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) +
geom_smooth(
  data = exchange_inaug |> filter(inauguration_period == 1 & date >= "2021-01-17" & date
  method = "lm",
  aes(color = "Inauguration Announcement"),
  formula = "y ~ x"
) + scale_color_manual(values = colors) +
labs(
  x = "Date",
  y = "USD v.s. CAD Exchange Rate",
  title = "Exchange Rate from 1974 to 2024",
  color = "Period"
) + theme(legend.position = "bottom")
```



5 Discussion

5.1 Expectation of the population

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Change of Political Party

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

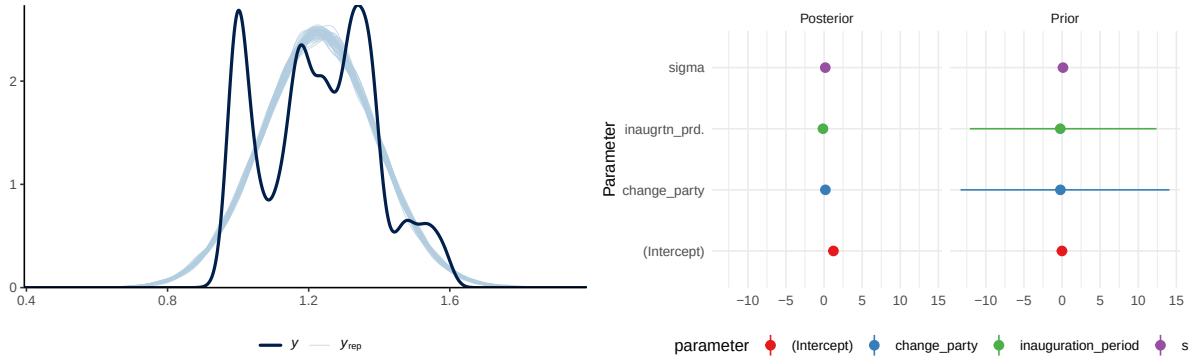
A Additional data details

B Model details

B.1 Posterior predictive check

In Figure 2a we implement a posterior predictive check. We can see that the regression outcome from our data and the simulation created by the posterior distribution are not closely matched. This is because our predictor variables only contribute to a small section of the data (40 out of 13358 observations has inauguration_period == 1, 30 out of 13358 has change_party == 1).

In Figure 2b we compare the posterior with the prior. We can see that the estimation parameters shifts minimally after taking data into account. This suggests that good prior parameters were set.



(a) Posterior prediction check

(b) Comparing the posterior with the prior

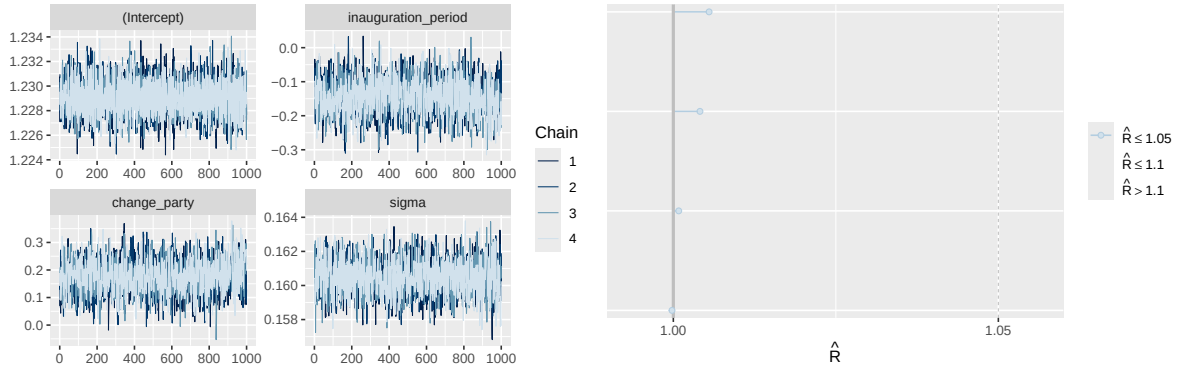
Figure 2: Examining how the model fits, and is affected by, the data

B.2 Diagnostics

Figure 3a is a trace plot. Trace plots are often used to diagnose abnormalities of models. For both plots, lines are oscillating vertically and maintains an overall horizontal trend. This suggests that there is nothing out of the ordinary for our model.

Figure 3b is a Rhat plot. Rhat plot is a valuable tool for assessing convergence in Bayesian regression models, helping ensure the reliability and validity of the model's inference results.

Both both plots, all data points are close to 1. This suggest that there is nothing out of the ordinary for our model.



(a) Trace plot

(b) Rhat plot

Figure 3: Checking the convergence of the MCMC algorithm

References

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.