

USD Exchange Rate decreases during Election Announcement Period*

Analysis of USD Exchange Rate Fluctuation during Inauguration week

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This paper analyzes the effect of US Presidential Election Announcement and a change of political party on the USD exchange rate. Daily exchange rates gathered from FRED and past presidential inauguration dates from multiple government websites are used in a generalized linear regression model to estimate the effects. We find that election result announcement has an average negative effect on USD exchange rate whereas a change of political party contributes positively with a slightly larger magnitude. Our result suggests that exchange USD for another currency closely after a Presidential election with a change of political party could be profitable, therefore it might be profitable to buy in USD during election result announcement weeks depending on the political party of the new president.

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

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1 Introduction

USD is one of the most popular currencies in circulation today. As a foreign buyer of USD product, the final price can vary greatly depending on the exchange rate between one's local currency and USD. Fluctuation of exchange rate can be attributed to multiple different factors. For example the difference in interest rate between two countries, inflation rate, etc. This paper will focus on one particular aspect that contributes to the change in USD exchange rate: the expectation of the populous on the future of the United States, perceived through the results of the US Presidential Election. The election of a new president is often one of the biggest political shifts for a country, shifts in strategies and focus will cause many people to reevaluate their faith for their country.

This paper seeks to explore the effect that the US Presidential Election result announcements have on USD interest rate. USD v.s. CAD exchange rate from 1971 to 2024 is pulled from the Federal Reserve Bank of St. Louis (2023) website, and past presidential election results and inauguration dates are gathered and double-checked through U.S. Department of Commerce (2023) and Frank LaRose (2023). The estimand of the paper is how the announcement and inauguration of a new US president, and how a change in political party, influence the USD exchange rate.

The result of our analysis indicates that the announcement and inauguration of a new US president has an average negative effects on USD exchange rate within the time frame of 1971 to 2024. If a change of political party has occurred for the new election season, where the leading party this season is different from the previous, then an average positive effect occurs. The magnitude of effect for the two factors suggest that, if the new president belongs to a

different party than the previous president, then the inauguration announcement will have a net positive effect on USD exchange rate.

Analyses and findings in this paper are structured into several sections: Section 2 – Data, Section 3 – Model, Section 4 – Results, and Section 5 – Discussion. The Data section examines all datasets and variables kept for analysis, followed by an explanation of their data cleaning processes. The Model section defines linear models used for further analysis, explain its components, and presents model justifications. The Result section focuses on visualizing and presenting the model results through data presented in Data section. The Discussion section further evaluate the interpretations behind the model results presented in the previous section, and touches on any weaknesses and next steps.

2 Data

The USD exchange rate data, denoted DEXCAUS (Board of Governors of the Federal Reserve System 2023), is obtained through the FRED website (Federal Reserve Bank of St. Louis 2023). The source of the dataset is the US Board of Governors of the Federal Reserve System (Board of Governors of the Federal Reserve System 2023). The past US president inauguration dates are pulled from the US Census Bureau (U.S. Department of Commerce 2023) and cross-referenced with Frank LaRose Ohio Secretary of State (Frank LaRose 2023).

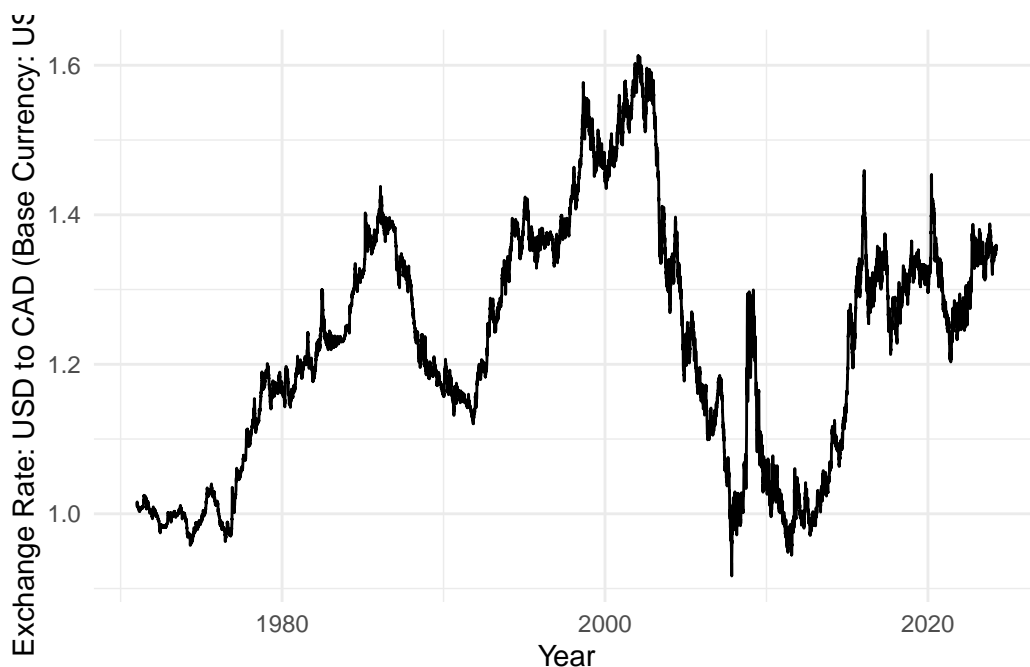


Figure 1: Exchange Rate from 1971 to 2024

Data is cleaned and analyzed using the open source statistical programming language R (R Core Team 2023) and supporting packages tidyverse (Wickham et al. 2019), janitor (Firke 2023), rstanarm (Goodrich et al. 2022), arrow (Richardson et al. 2024), ggplot2 (Wickham 2016), and knitr (Xie 2023), with additional help from Microsoft Excel (Microsoft Corporation 2023). Detailed description of each dataset can be found in the subsections below.

2.1 Data on Exchange Rate

The DEXCAUS (Board of Governors of the Federal Reserve System 2023) dataset includes the daily exchange rate between USD and CAD (base USD = 1) from 1971-01-04 to 2024-03-29 (date the dataset is downloaded for the purpose of the paper). Raw data contains only the date and the corresponding exchange rate of the day. Exchange rate in this dataset is used as the estimate of this paper. See Figure 1 for visualization of this dataset.

2.2 Data on Election Results

In order to measure the effect that the population’s faith to their country have on exchange rate, this paper focuses on one particular political event that will quickly change the population’s expectation for their country in a short amount of time, the presidential election. Analysis will be focused on the election result announcement and the inauguration period (please see specific definition of the term inauguration period in the subsection below Section 2.2.1). Data of past election results and inauguration dates are obtained through the US Census Bureau (U.S. Department of Commerce 2023) and cross-referenced with Frank LaRose Ohio Secretary of State (Frank LaRose 2023) for accuracy. The final dataset use the inauguration dates and political party information to determine the effect of having a new president on the USD exchange rate. See Table 1 for a sample of the election result dataset.

Table 1: Sample of past inauguration dates information

| President | Party | Inauguration Date |
|----------------------|------------|-------------------|
| Gerald R. Ford | Republican | 1974-08-09 |
| Jimmy Carter | Democrat | 1977-01-20 |
| Ronald Reagan | Republican | 1981-01-20 |
| George H.W. Bush | Republican | 1989-01-20 |
| Bill Clinton | Democrat | 1993-01-20 |
| George W. Bush | Republican | 2001-01-20 |
| Barack Obama | Democrat | 2009-01-20 |
| Donald J. Trump | Republican | 2017-01-20 |
| Joseph R. Biden, Jr. | Democrat | 2021-01-20 |

2.2.1 Construction of Inauguration Week

Using the inauguration date information present in the dataset, we will construct an announcement period, allowing the news of the result to sink in and give time for the exchange rate to react to the announcement. This period needs to be relatively short to ensure that the change in exchange rate is causal by the election result announcement and **only** the announcement.

The final construction will be referred to as the *inauguration week* for the remainder of this paper. The inauguration week is a ± 3 days week centered on the original inauguration date for each past US president.

Day1 *Day2* *Day3* **Inauguration Day** *Day5* *Day6* *Day7*

2.3 Final Dataset

The final dataset, Table 2, combines the date and exchange rate columns from the DEXCAUS (Board of Governors of the Federal Reserve System 2023) dataset and uses the inauguration week (constructed through the inauguration dates from the election results dataset, Section 2.2). The column *Inauguration Period* has a value of 1 if the date is within the inauguration week and 0 otherwise. A new column *Change Party* is added, it receives a value of 1 if the political party of the new president is different from the previous president's and 0 otherwise.

Table 2: Sample of the final dataset used for analysis

| Date | Exchange Rate | Inauguration Period | Change Party |
|------------|---------------|---------------------|--------------|
| 1977-01-12 | 1.0049 | 0 | 0 |
| 1977-01-13 | 1.0071 | 0 | 0 |
| 1977-01-14 | 1.0015 | 0 | 0 |
| 1977-01-17 | 1.0115 | 1 | 1 |
| 1977-01-18 | 1.0139 | 1 | 1 |

3 Model

The goal of our modelling strategy is twofold. Firstly, a binary indicator variable will estimate the magnitude of effect the US presidential announcement and inauguration have on the US exchange rate. Secondly, the influence of a change in political party between the an US president and their predecessor will also be estimated.

Magnitude of effect created by the helpline efforts can be estimated through linear models. Gaussian regression model is best suited for our analytical purposes. Other generalized linear

models such as Logistic and Multilevel are not considered due to the nature of the variables in interest. Logistic regression model requires data that yields either an **yes** or **no** result, whereas multilevel model require more complexity between variables. Due to the nature of the Poisson function, the Poisson model requires count variable not available for our dataset. Background details and diagnostics are included in Appendix [A](#).

3.1 Model set-up

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

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

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

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

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

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

Where:

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

Table 3: 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 |

4 Results

Table 3 shows the coefficients of the predictor variables of our Model. We are concerned with the top half of the table, as it provides the values of the intercept representing the average exchange rate during non-inauguration weeks as well as the coefficient representing effect size of inauguration periods and changes in political party.

Looking at the values, we see that, outside of inauguration announcement weeks, the average exchange rate between USD and CAD is 1.23 between the years 1971 to 2024. When a new US president is announced and subsequently inaugurated, an average of 0.14 drop occurs to the USD exchange rate. In practical terms, this means that a 11% drop from the average exchange rate of 1.23 occurred in the span of 1 week due to the announcement.

However, looking at the third coefficient, the 0.18 coefficient for the *change_party* variable suggests that, if a change of political party occurred during the current election season, then the US exchange rate will increase by 0.18 unit. This suggests that the net effect of announcing a new president who comes from a different political party than their immediate predecessor will, on average, increase the USD exchange rate by 0.04.

4.1 Explanation for small R^2

The model summary table Table 3 shows an extremely small R^2 value. The R^2 value is traditionally used to indicate the explanatory power of the model, that is, how trustworthy the model is on estimating the relationship between the estimand and the estimate.

Many factors contribute to the R^2 value, one of the most prominent factors in our case is the effect size of our estimand. As mentioned in the introduction section, the estimand of this

paper is how the announcement and inauguration of a new US president, and how a change in political party, influence the USD exchange rate. There are 13358 observations in the final dataset used for modelling, out of all of these observations, 40 of them contributes to the measurement of the effect of inauguration announcement, and 30 on the effect of a change in political party. In a practical sense, only 0.3% of the data are used to estimate the effect of the inauguration announcement and even less on the change of party. This contributes the the low R^2 value significantly. Despite this, the model has still proven to be a good fit (see Section A), the predictors are still valuable despite the low R-squared. Figure 2 visualizes the effect size (in blue) and the remaining observations outside of the inauguration periods.

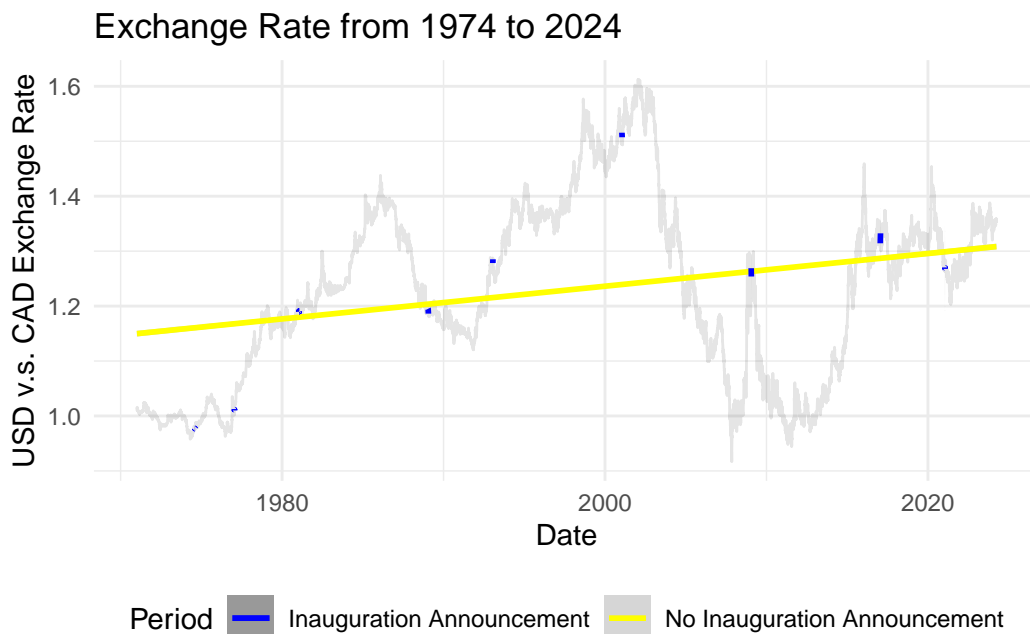


Figure 2: Effect size visualization

5 Discussion

5.1 Expectation of the population

Population expectation plays a significant role as a key driver of exchange rate fluctuations in the field of economics. However, the term expectation is often ambiguous and hard to quantify. This paper seeks to explore the tangible impact of expectations on exchange rates by focusing on a specific, highly influential event: the U.S. presidential election. This particular event was chosen for its prominence and its profound effect on national sentiment. It stands out due to its high engagement levels among U.S. citizens, with a notable participation rate of

66.8% among eligible voters aged 18 and older in the 2020 presidential election, according to data referenced from U.S. Census Bureau (2021a) (surveys conducted by U.S. Census Bureau (2021b)).

The presidential election is an optimal choice for analysis not only because of its widespread recognition and significant voter turnout but also due to its measurable impact on economic indicators such as the exchange rate. As detailed in the section Section 4 of this paper, there is an observable pattern related to changes in political leadership and their effects on currency valuation. Specifically, the inauguration week of a new president who belongs to the same political party as their immediate predecessor typically sees an decrease in the exchange rate by 11% compared to the exchange rate at non-inauguration weeks. Conversely, a change in the ruling party correlates with an average net increase of 3.25% in the exchange rate. Viewing an increase in the exchange rate as an indicator of growing confidence in the country's direction, these findings suggest several implications about public sentiment and economic expectations.

5.2 Ideology of Political Parties

During election seasons, the focus isn't just on the incumbent president but also heavily on the speeches and promises made by presidential candidates. These candidates not only present their personal ideologies but also propose new policies and legislative changes they plan to implement if elected.

Candidates from the same political party often share core values and ideologies, yet they might differ in their specific priorities and proposed policies. For instance, it's common for all Democratic candidates to support initiatives related to refugee and immigration issues, although their specific approaches to these issues can vary. When candidates from the same party are elected, it typically indicates that they will continue the country's current trajectory, particularly in how the U.S. handles international affairs. Electing a candidate from the same party as the incumbent suggests that voters are generally pleased with the current direction of the nation and wish to maintain continuity.

On the other hand, when a candidate from a different political party is elected, it usually signifies that a significant portion of the electorate believes the country needs a new direction. This desire for change is reflected in the public's support for the candidate's proposed shifts in political focus and new policies. This can lead to a change in how the U.S. is perceived both domestically and internationally.

The election of a president from a different party than their predecessor often results in an increase in the USD exchange rate. This phenomenon can occur because the financial markets react to the potential for substantial policy changes that may foster economic growth or improve the fiscal outlook of the country. Investors might anticipate that new policies will be beneficial for business and economic stability, which can lead to increased foreign investment

and a stronger dollar. The promise of a fresh approach and new leadership can instill confidence among investors and the business community, leading to positive fluctuations in the currency's value.

5.3 External Shifts

The influence of expectation extends beyond just the domestic population of the United States. It also significantly affects foreign stakeholders such as holders of U.S. government bonds and owners of international companies that contribute to the U.S. GDP. These groups are deeply interested in the stability and policies of the U.S. economy because changes can directly impact their investments and business operations. As such, their perceptions and expectations about the U.S. economy can lead to fluctuations in the USD exchange rates.

Furthermore, the inauguration of a new president can lead to shifts in international relations and economic policies. This change in leadership can create uncertainty about future policies, which might affect existing collaborations and agreements made during the previous administration. For example, a new president might reconsider or revise international trade agreements, which could potentially disrupt established economic partnerships. Such uncertainties may lead to instability in exchange rates as investors and foreign businesses try to predict and adapt to the new policy environment. Political dynamics in the United States can have a far-reaching impact on global economic interactions and the overall behavior of the USD on the international stage.

5.4 Weaknesses and next steps

The proposed model, while insightful, has several limitations that need addressing to enhance its accuracy and applicability. One of the primary weaknesses is its small effect size, which contributes to its low explanatory power, making it less effective in predicting USD exchange rate fluctuations around U.S. presidential inaugurations. Additionally, the model does not account for inauguration dates following the re-election of a sitting president, which can introduce bias into the estimations. Furthermore, it overlooks the constitutional limit that prevents a president from being elected more than twice consecutively, which could skew results where such scenarios are relevant.

Moving forward, the next steps to refine the model include a comprehensive collection of all election announcement dates for past U.S. presidents who have been re-elected consecutively. This data will be integrated into the model to provide a more accurate reflection of political impacts on economic indicators. Additionally, it's crucial to isolate and eliminate the influence of other significant events that historically affect the USD exchange rate. By addressing these points, the data can offer more reliable and significant insights into the dynamics between presidential elections and economic fluctuations.

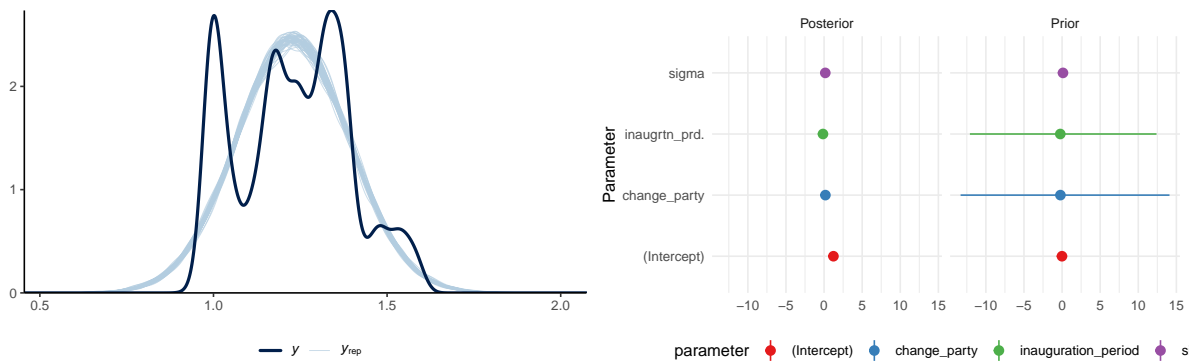
Appendix

A Model details

A.1 Posterior predictive check

In Figure 3a 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 3b 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 3: Examining how the model fits, and is affected by, the data

A.2 Diagnostics

Figure 4a 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 4b 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.

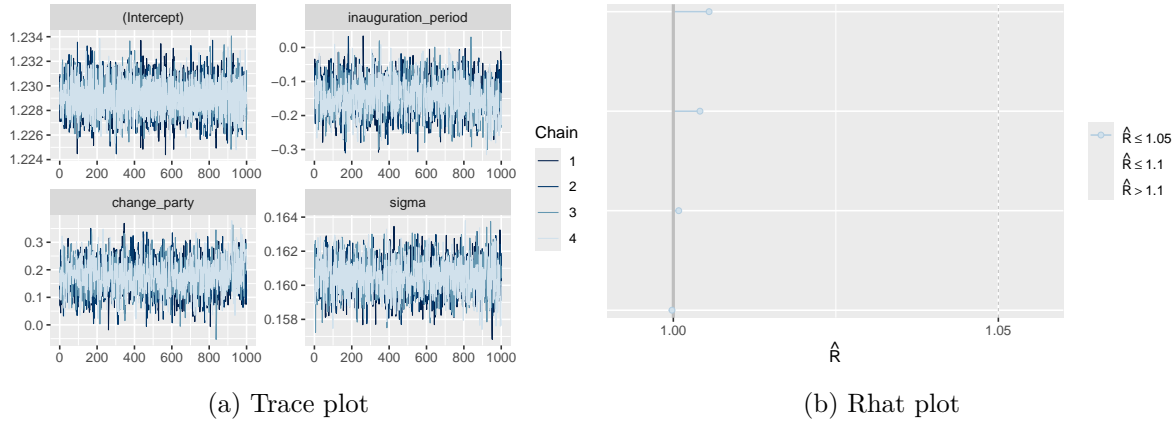


Figure 4: Checking the convergence of the MCMC algorithm

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