The relationship between Inflation rate and Interest rate, and it can influence Stock and Cryptocurrency Market*

Market factors can be affected by Inflation rate and Interest rate changes

Hyungsoo Parks

April 16, 2024

This paper explores the correlation between inflation rate and interest rated since both of them increased significantly last few years and the both rates are the important factors of the global economy. Additionaly, In this In the past few years, many stock items and cryptocurrencies fluctuated wildly. This research studies the corellation between the inflation rate and interest rate, and how the two important factors in economy impact to the stock and cryptocurrency market. Overall, the inflation rate and interest rate can be considered for future market trends.

Table of contents

*Code and data are available at: https://github.com/kakaomonk/inflation_interest_rate_and_market_trends

1 Introduction

Throughout last few years, the inflation rate and the interest rate have been increased rampantly after pandemic, and every government tried to control the inflation rate and interest rate, but it requires a long duration to stabilize the inflation rate and interest rate since those are related to almost all factors in economy. According to… (**citezzzzzz?**), stabilizing the rate would take for a while.

In this paper

You can and should cross-reference sections and sub-sections. We use R Core Team (2023) and (**rohan?**).

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

2 Data

The major 4 data sets in this research are “historical inflation rate in Canada”(Canada 2024), “historical interest rate in Canada”(2024a), “historical NASDAQ index price”(2024b), and “historical Bitcoin price”(2024c). The raw historical inflation data contains quarterly inflation rate in Canada last 10 years. The raw historical interest rate contains montly interest rate in Canada last 10 years. In case of the data sets contain NASDAQ index and Bitcoin price contain monthly price data of each index.

2.1 Data Cleaning

The raw data sets were cleaned with R(R Core Team 2023), Tidyverse(Wickham et al. 2019), Lubridate(Vitalie Spinu 2023). Since the inflation rate and interest rate do not change frequently, the NASDAQ index price and Bitcoin price need to be analyzed in quarterly data. The collected daily raw NASDAQ index and Bitcoin price could be converted to quarter data by Lubridate(Vitalie Spinu 2023) package.

2.2 Variables in interest

The study focuses on the correlation between the inflation rate and the interest rate in Canada, and how they impact on the stock market and cryptocurrency price. The interest variables in this study are 'CPI inflation rate', 'interest rate', 'NASDAQ index close price', and 'Bitcoin close price'. Note that 'CPI inflation rate' and 'interest rate' do not fluctuate as often as other variables. Thus, the study will focus on the quarter data rather than other periods.

Below tablesTable 4 are examples of the cleaned data sets.

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

Quarter	Inflation
2014 Q3	2.0666667
2014 Q4	1.9666667
2015 Q1	1.0666667
2015 Q2	0.9000000
2015 Q3	1.2000000
2015 Q4	1.3333333
2016 Q1	1.5666667
2016 Q2	1.5666667
2016 Q3	1.2333333
2016 Q4	1.4000000
2017 Q1	1.9000000
2017 Q2	1.3000000
2017 Q3	1.4000000
2017 Q4	1.8000000
2018 Q1	2.0666667
2018 Q2	2.3000000
2018 Q3	2.6666667
2018 Q4	2.0333333
2019 Q1	1.6000000
2019 Q2	2.1333333
2019 Q3	1.9333333

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

Quarter	Inflation
2019 Q4	2.1000000
2020 Q1	1.8333333
2020 Q2	0.0333333
2020 Q3	0.2333333
2020 Q4	0.8000000
2021 Q1	1.4333333
2021 Q2	3.3666667
2021 Q3	4.0666667
2021 Q4	4.7333333
2022 Q1	5.8333333
2022 Q2	7.5333333
2022 Q3	7.1666667
2022 Q4	6.6666667
2023 Q1	5.1333333
2023 Q2	3.5333333
2023 Q3	3.7000000
2023 Q4	3.2000000
2024 Q1	NA

Table 2: Explanatory models of flight time based on wing width and wing length

Quarter	Interest
2014 Q2	1.2500000
2014 Q3	1.2500000
2014 Q4	1.2500000
2015 Q1	1.0000000
2015 Q2	1.0000000
2015 Q3	0.7500000
2015 Q4	0.7500000
2016 Q1	0.7500000
2016 Q2	0.7500000
2016 Q3	0.7500000
2016 Q4	0.7500000
2017 Q1	0.7500000
2017 Q2	0.7500000
2017 Q3	1.0833333
2017 Q4	1.2500000
2018 Q1	1.5000000

Table 2: Explanatory models of flight time based on wing width and wing length

Quarter	Interest
2018 Q2	1.5000000
2018 Q3	1.7500000
2018 Q4	2.0000000
2019 Q1	2.0000000
2019 Q2	2.0000000
2019 Q3	2.0000000
2019 Q4	2.0000000
2020 Q1	1.6666667
2020 Q2	0.5000000
2020 Q3	0.5000000
2020 Q4	0.5000000
2021 Q1	0.5000000
2021 Q2	0.5000000
2021 Q3	0.5000000
2021 Q4	0.5000000
2022 Q1	0.5833333
2022 Q2	1.4166667
2022 Q3	3.0000000
2022 Q4	4.0000000
2023 Q1	4.6666667
2023 Q2	4.8333333
2023 Q3	5.2500000
2023 Q4	5.2500000
2024 Q1	5.2500000

Table 3: Explanatory models of flight time based on wing width and wing length

Quarter	Close
2014 Q3	4530.519
2014 Q4	4600.939
2015 Q1	4825.264
2015 Q2	5030.167
2015 Q3	4924.328
2015 Q4	4998.138
2016 Q1	4614.201
2016 Q2	4845.712
2016 Q3	5168.889
2016 Q4	5309.890

Table 3: Explanatory models of flight time based on wing width and wing length

Quarter	Close
2017 Q1	5736.322
2017 Q2	6095.442
2017 Q3	6343.130
2017 Q4	6758.381
2018 Q1	7253.849
2018 Q2	7355.939
2018 Q3	7874.577
2018 Q4	7215.114
2019 Q1	7343.622
2019 Q2	7874.739
2019 Q3	8067.464
2019 Q4	8445.709
2020 Q1	8771.730
2020 Q2	9091.000
2020 Q3	10926.834
2020 Q4	11954.430
2021 Q1	13351.457
2021 Q2	13848.436
2021 Q3	14839.972
2021 Q4	15390.787
2022 Q1	14000.620
2022 Q2	12195.240
2022 Q3	11891.070
2022 Q4	10871.376
2023 Q1	11481.441
2023 Q2	12676.756
2023 Q3	13785.278
2023 Q4	13910.687
2024 Q1	15692.029
2024 Q2	16256.059

Table 4: Explanatory models of flight time based on wing width and wing length

Quarter	Close
2014 Q3	4530.519
2014 Q4	4600.939
2015 Q1	4825.264
2015 Q2	5030.167

Table 4: Explanatory models of flight time based on wing width and wing length

Quarter	Close
2015 Q3	4924.328
2015 Q4	4998.138
2016 Q1	4614.201
2016 Q2	4845.712
2016 Q3	5168.889
2016 Q4	5309.890
2017 Q1	5736.322
2017 Q2	6095.442
2017 Q3	6343.130
2017 Q4	6758.381
2018 Q1	7253.849
2018 Q2	7355.939
2018 Q3	7874.577
2018 Q4	7215.114
2019 Q1	7343.622
2019 Q2	7874.739
2019 Q3	8067.464
2019 Q4	8445.709
2020 Q1	8771.730
2020 Q2	9091.000
2020 Q3	10926.834
2020 Q4	11954.430
2021 Q1	13351.457
2021 Q2	13848.436
2021 Q3	14839.972
2021 Q4	15390.787
2022 Q1	14000.620
2022 Q2	12195.240
2022 Q3	11891.070
2022 Q4	10871.376
2023 Q1	11481.441
2023 Q2	12676.756
2023 Q3	13785.278
2023 Q4	13910.687
2024 Q1	15692.029
2024 Q2	16256.059

Talk way more about it.

Table 5: Explanatory models of flight time based on wing width and wing length

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.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

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 5.

5 Discussion

5.1 First discussion point

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 Second discussion point

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 **?@fig-ppcheckandposteriorvsprior-1** we implement a posterior predictive check. This shows…

In **?@fig-ppcheckandposteriorvsprior-2** we compare the posterior with the prior. This shows…

Examining how the model fits, and is affected
by, the data

B.2 Diagnostics

?@fig-stanareyouokay-1 is a trace plot. It shows… This suggests…

?@fig-stanareyouokay-2 is a Rhat plot. It shows… This suggests…

Checking the convergence of the MCMC algo-
rithm

References

2024a.

2024c.

2024b.

Canada, Bank of. 2024. "Inflation: Definitions, Graphs and Data." https://www.bankofcanada.ca/rates/indicators/capacity-and-inflation-pressures/inflation/.

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/.

Vitalie Spinu, Hadley Wickham, Garrett Grolemund. 2023. *Lubridate: Make Dealing with Dates a Little Easier*.

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*. Vol. 4. https://doi.org/10.21105/joss.01686.