

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

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This paper explores the correlation between inflation rate and interest rate since both of them increased significantly last few years and the both rates are the important factors of the global economy. Additionally, In the past few years, many stock items and cryptocurrencies fluctuated wildly. This research studies the correlation 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.

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

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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?**).

Furthermore, Section 2 explains the data cleaning process and variables of interest that are the most important factor of this research.

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 of 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 variables of interest 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 1 are examples of the cleaned data sets.

Table 1: Example of Cleaned data sets

Quarter	Inflation	Interest	NASDAQ_close	Bitcoin_close
2014 Q3	2.0666667	1.2500000	4530.519	407.1824
2014 Q4	1.9666667	1.2500000	4600.939	357.0751
2015 Q1	1.0666667	1.0000000	4825.264	251.2097
2015 Q2	0.9000000	1.0000000	5030.167	236.8583
2015 Q3	1.2000000	0.7500000	4924.328	254.8597
2015 Q4	1.3333333	0.7500000	4998.138	346.0371
2016 Q1	1.5666667	0.7500000	4614.201	410.7288
2016 Q2	1.5666667	0.7500000	4845.712	512.4928
2016 Q3	1.2333333	0.7500000	5168.889	615.7026
2016 Q4	1.4000000	0.7500000	5309.890	732.7220
2017 Q1	1.9000000	0.7500000	5736.322	1034.7074
2017 Q2	1.3000000	0.7500000	6095.442	1912.5522
2017 Q3	1.4000000	1.0833333	6343.130	3482.1494
2017 Q4	1.8000000	1.2500000	6758.381	9507.3762
2018 Q1	2.0666667	1.5000000	7253.849	10568.0623
2018 Q2	2.3000000	1.5000000	7355.939	7766.9677
2018 Q3	2.6666667	1.7500000	7874.577	6821.3166
2018 Q4	2.0333333	2.0000000	7215.114	5200.0905
2019 Q1	1.6000000	2.0000000	7343.622	3799.3305
2019 Q2	2.1333333	2.0000000	7874.739	7301.4462
2019 Q3	1.9333333	2.0000000	8067.464	10381.6539

Table 1: Example of Cleaned data sets

Quarter	Inflation	Interest	NASDAQ_close	Bitcoin_close
2019 Q4	2.1000000	2.0000000	8445.709	8019.3628
2020 Q1	1.8333333	1.6666667	8771.730	8267.6904
2020 Q2	0.0333333	0.5000000	9091.000	8665.5917
2020 Q3	0.2333333	0.5000000	10926.834	10633.9067
2020 Q4	0.8000000	0.5000000	11954.430	16840.7206
2021 Q1	1.4333333	0.5000000	13351.457	45323.7754
2021 Q2	3.3666667	0.5000000	13848.436	46497.7816
2021 Q3	4.0666667	0.5000000	14839.972	41988.7721
2021 Q4	4.7333333	0.5000000	15390.787	55881.2525
2022 Q1	5.8333333	0.5833333	14000.620	41298.6414
2022 Q2	7.5333333	1.4166667	12195.240	32499.5540
2022 Q3	7.1666667	3.0000000	11891.070	21252.3315
2022 Q4	6.6666667	4.0000000	10871.376	18072.0500
2023 Q1	5.1333333	4.6666667	11481.441	22876.9252
2023 Q2	3.5333333	4.8333333	12676.756	28034.0847
2023 Q3	3.7000000	5.2500000	13785.278	28091.3287
2023 Q4	3.2000000	5.2500000	13910.687	36296.4282

According to Table 1, all variables of interest are cleaned and combined properly by each quarter from the thrid quarter in 2014 to the fourth quarter of 2023.

2.2.1 Note

The inflation rate and interest rate do not change as often as NASDAQ index and cryptocur-
rency, and the fluctuations are not severe compare to the others. On the other hand, there
is a open time and close time for the stock market, but there cryptocurrency market never
closes. # Model {#sec-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.

2.3 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.

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

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \quad (1)$$

$$\mu_i = \alpha + \beta_i + \gamma_i \quad (2)$$

$$\alpha \sim \text{Normal}(0, 2.5) \quad (3)$$

$$\beta \sim \text{Normal}(0, 2.5) \quad (4)$$

$$\gamma \sim \text{Normal}(0, 2.5) \quad (5)$$

$$\sigma \sim \text{Exponential}(1) \quad (6)$$

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`.

2.3.1 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 .

3 Results

Our results are summarized in Table 2.

4 Discussion

4.1 First discussion point

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

4.2 Second discussion point

4.3 Third discussion point

4.4 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

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