

Evaluating the Big Mac Index as a Predictor for Inflation

Marco Chau, Julia Wong, Cindy Ly

2023-03-27

Abstract

Insert abstract paragraph here.

Contents

1	Introduction	2
2	Data	2
2.1	Sources	2
2.2	Summary of variables	15
2.3	Distributions	15
2.4	Scatterplots	16
3	Results	19
3.1	Pearson's R	19
4	Discussion	25
0.0.1	Load in Big Mac and inflation data from directory	
0.0.2	Convert date columns from character class to date class	

1 Introduction

The Big Mac Index (BMI) was introduced by The Economist in 1986 as an informal means of measuring purchasing power parity (PPP) between currencies. Mathematically, the BMI is the price ratio of Big Macs between two countries. The index provided a more tangible method of determining the difference between the real purchasing power between two countries that exchange rate alone may not reflect. Although the BMI is an informal measurement, its application is rooted in PPP theory which states that the exchange rate between two currencies is proportional to the ratio of price levels in their respective countries. The use of the Big Mac as a tool for economic analysis was subsequently coined the term ‘Burgernomics’. Discrepancies between the BMI and the exchange rate of two countries suggests that one currency is overvalued (or undervalued) compared to the other. Since its conception in 1986, the BMI has been written about and evaluated extensively by economists, academics, and journalists for its strengths and limitations as a measure for real exchange rates between two currencies.¹ Since the evaluation of the BMI as a measure of PPP has taken the spotlight, there is a limited amount of literature that discusses the use of Burgernomics as a predictor for inflation rate within a country. The inflation rate measures the price changes in a predetermined basket of goods in a given economy and is meant to reflect changes in consumer purchasing power from year to year. This paper extends the use of the BMI as a validator of exchange rates between two currencies to a validator of reported inflation rates of a currency between two periods in time.

In this paper we examine the differences between the inflation rate and the changes in the price of Big Macs in three countries: Canada, Japan, and the United Kingdom between 2000 - 2022. By examining differences between the inflation rate of Big Macs (which will be the Big Mac Index in the context of this paper) and the reported inflation rates of each country, we hope to determine whether the BMI can be an accurate predictor of the inflation rate, and whether reported inflation rates reflect the real changes in purchasing power from one year to the next within a country’s borders. To evaluate our findings, we propose the following hypotheses:

Null Hypothesis: The Big Mac Index is not an accurate predictor of the inflation rate.

Alternative Hypothesis: The Big Mac Index is an accurate predictor of the inflation rate.

In section 2 we discuss: the source of the Big Mac and inflation data, how the BMI is calculated, how local currencies are calculated, the strengths and limitations of our source and methodology for analysis, and assumptions we made prior to analysis. In this section, we also provide a summaries of our dataset. In section 3 we show the results from evaluating Pearson’s R and the linear regression of each country. Section 4 discusses the implications that the results in section 3 means for our hypotheses and the broader economic context.

2 Data

2.1 Sources

The price of Big Macs in local currencies is sourced from data provided by the *The Economist*² and the exchange rate used to calculate the price of Big Macs in U.S. Dollars (USD) is provided by *Reuters*.³ The CSV file that combines this data was downloaded from a GitHub repository.⁴ We also added to the dataset by calculating the BMI, the price of Big Macs in USD, and the inflation rate in a given year. The Big Mac Index was calculated by finding the percentage change difference of prices in the local currency from one year to the next. USD prices of Big Macs which was calculated by dividing the price of Big Macs in the local currency by the reported exchange rates during the given year. The inflation rate of Canada was sourced

¹Kenneth W. Celements and Seah (2012)

²Economist (2023)

³Reuters (2022)

⁴futuraprime (2022)

from the Bank of Canada's website.⁵ The inflation rate of the United Kingdom was sourced from the Office for National Statistics⁶ and the inflation rate of Japan was sourced from macrotrends.⁷

Summary of Canadian data:

```
##      name          iso_a3      currency_code      local_price
## Length:23      Length:23      Length:23      Min.      :2.850
## Class :character Class :character Class :character 1st Qu.:3.425
## Mode  :character Mode  :character Mode  :character Median :4.730
##                                           Mean  :4.844
##                                           3rd Qu.:5.985
##                                           Max.   :6.880
##
##      dollar_ex      GDP_dollar      GDP_local      date
## Min.      :0.9458 Min.      :22341 Min.      :33191 Min.      :2000-04-01
## 1st Qu.:1.0637 1st Qu.:34308 1st Qu.:43007 1st Qu.:2005-11-15
## Median :1.2823 Median :43626 Median :49912 Median :2011-07-01
## Mean   :1.2417 Mean   :40903 Mean   :49608 Mean   :2011-06-06
## 3rd Qu.:1.3341 3rd Qu.:47201 3rd Qu.:56274 3rd Qu.:2016-12-30
## Max.   :1.5700 Max.   :52744 Max.   :65300 Max.   :2022-07-01
##
## big_mac_index      inflation_rate
## Min.      :-4.890 Min.      :-0.900
## 1st Qu.: 0.000 1st Qu.: 1.300
## Median : 2.693 Median : 2.050
## Mean   : 4.154 Mean   : 2.218
## 3rd Qu.: 7.835 3rd Qu.: 2.875
## Max.   :16.842 Max.   : 7.600
## NA's    :1 NA's    :1
```

Summary of British data:

```
##      name          iso_a3      currency_code      local_price
## Length:23      Length:23      Length:23      Min.      :1.880
## Class :character Class :character Class :character 1st Qu.:1.990
## Mode  :character Mode  :character Mode  :character Median :2.390
##                                           Mean  :2.574
##                                           3rd Qu.:3.090
##                                           Max.   :3.690
##
##      dollar_ex      GDP_dollar      GDP_local      date
## Min.      :0.4966 Min.      :27817 Min.      :17756 Min.      :2000-04-01
## 1st Qu.:0.6005 1st Qu.:39416 1st Qu.:22617 1st Qu.:2005-11-15
## Median :0.6463 Median :42171 Median :25860 Median :2011-07-01
## Mean   :0.6597 Mean   :40608 Mean   :26251 Mean   :2011-06-06
## 3rd Qu.:0.7443 3rd Qu.:44245 3rd Qu.:30221 3rd Qu.:2016-12-30
## Max.   :0.8311 Max.   :50676 Max.   :34311 Max.   :2022-07-01
##
## big_mac_index      inflation_rate
## Min.      :-5.528 Min.      :0.500
## 1st Qu.: 0.000 1st Qu.:1.525
```

⁵Canada (2023)

⁶National Statistics (2023)

⁷macrotrends (2023)

```
## Median : 2.995   Median :2.050
## Mean   : 3.155   Mean    :2.323
## 3rd Qu.: 4.644   3rd Qu.:2.475
## Max.    :15.075   Max.    :8.800
## NA's    :1       NA's     :1
```

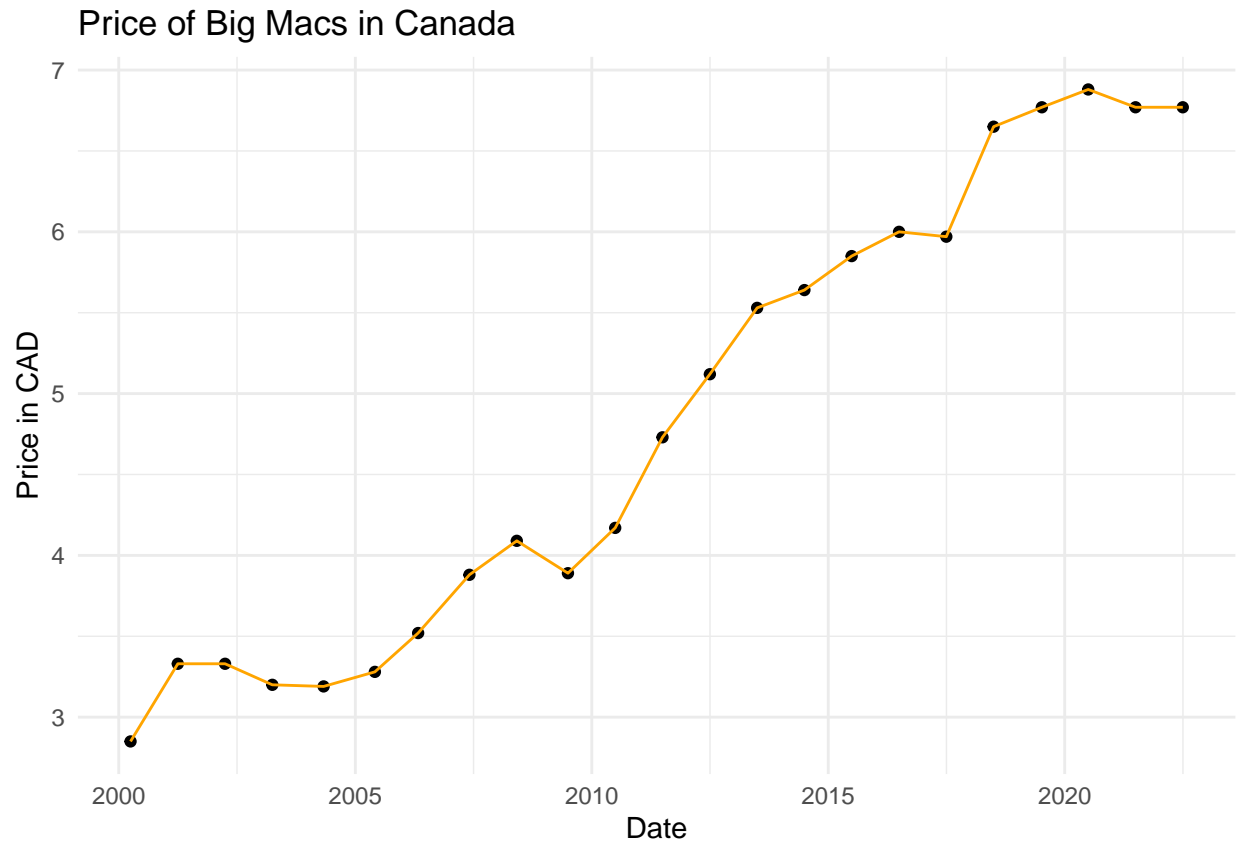
Summary of Japanese data:

```
##      name          iso_a3      currency_code    local_price
## Length:23      Length:23      Length:23      Min.    :250
## Class :character Class :character Class :character 1st Qu.:280
## Mode  :character Mode  :character Mode  :character Median :320
##                                           Mean   :325
##                                           3rd Qu.:375
##                                           Max.    :390
##
##      dollar_ex      GDP_dollar      GDP_local      date
## Min.    : 78.22     Min.    :32832     Min.    :3880330   Min.    :2000-04-01
## 1st Qu.:103.77     1st Qu.:36322     1st Qu.:4093258   1st Qu.:2005-11-15
## Median :108.77     Median :39173     Median :4171596   Median :2011-07-01
## Mean    :108.60     Mean    :39285     Mean    :4160551   Mean    :2011-06-06
## 3rd Qu.:116.53     3rd Qu.:40320     3rd Qu.:4256717   3rd Qu.:2016-12-30
## Max.    :137.87     Max.    :49175     Max.    :4424718   Max.    :2022-07-01
##
##      big_mac_index      inflation_rate
## Min.    :-10.884       Min.    :-1.3500
## 1st Qu.: 0.000         1st Qu.: -0.2675
## Median : 0.000         Median : -0.0150
## Mean    : 1.445         Mean    : 0.2295
## 3rd Qu.: 0.000         3rd Qu.: 0.4775
## Max.    : 15.625        Max.    : 2.7600
## NA's     :1            NA's     :1
```

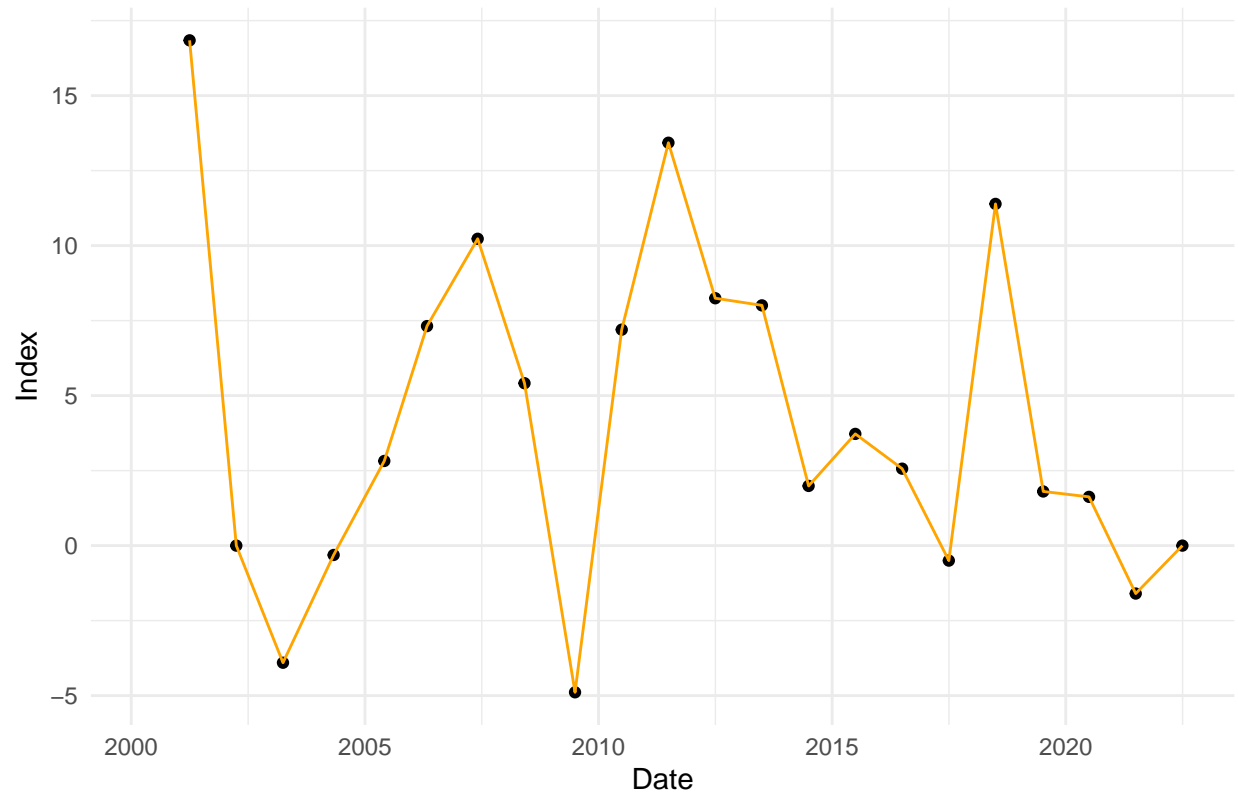
summary of combined data:

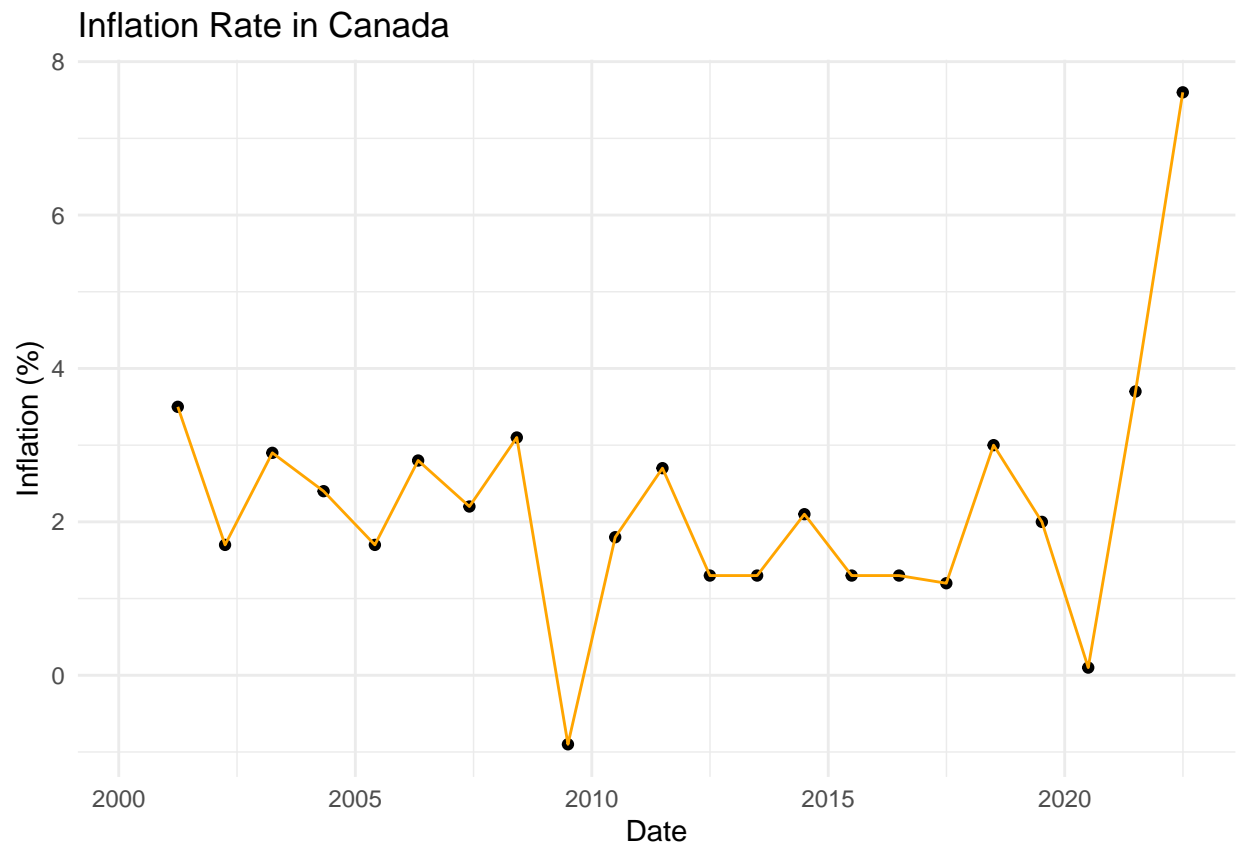
```
##      name          iso_a3      currency_code    local_price
## Length:69      Length:69      Length:69      Min.    : 1.88
## Class :character Class :character Class :character 1st Qu.: 2.99
## Mode  :character Mode  :character Mode  :character Median : 4.73
##                                           Mean   :110.79
##                                           3rd Qu.:280.00
##                                           Max.    :390.00
##
##      dollar_ex      dollar_price      GDP_dollar      GDP_local
## Min.    : 0.4966     Min.    :1.939     Min.    :22341     Min.    : 17756
## 1st Qu.: 0.7539     1st Qu.:2.885     1st Qu.:36440     1st Qu.: 30719
## Median : 1.2823     Median :3.644     Median :40904     Median : 49912
## Mean    : 36.8333     Mean    :3.644     Mean    :40266     Mean    :1412137
## 3rd Qu.:101.5300     3rd Qu.:4.277     3rd Qu.:45136     3rd Qu.:4081287
## Max.    :137.8650     Max.    :5.314     Max.    :52744     Max.    :4424718
##
##      date          big_mac_index      inflation_rate
## Min.    :2000-04-01   Min.    :-10.8844   Min.    :-1.3500
```

##	1st Qu.:	2005-06-01	1st Qu.:	0.0000	1st Qu.:	0.3725
##	Median	:2011-07-01	Median	: 0.8124	Median	: 1.5500
##	Mean	:2011-06-06	Mean	: 2.9179	Mean	: 1.5902
##	3rd Qu.:	2017-07-01	3rd Qu.:	5.2435	3rd Qu.:	2.4000
##	Max.	:2022-07-01	Max.	: 16.8421	Max.	: 8.8000
##			NA's	:3	NA's	:3

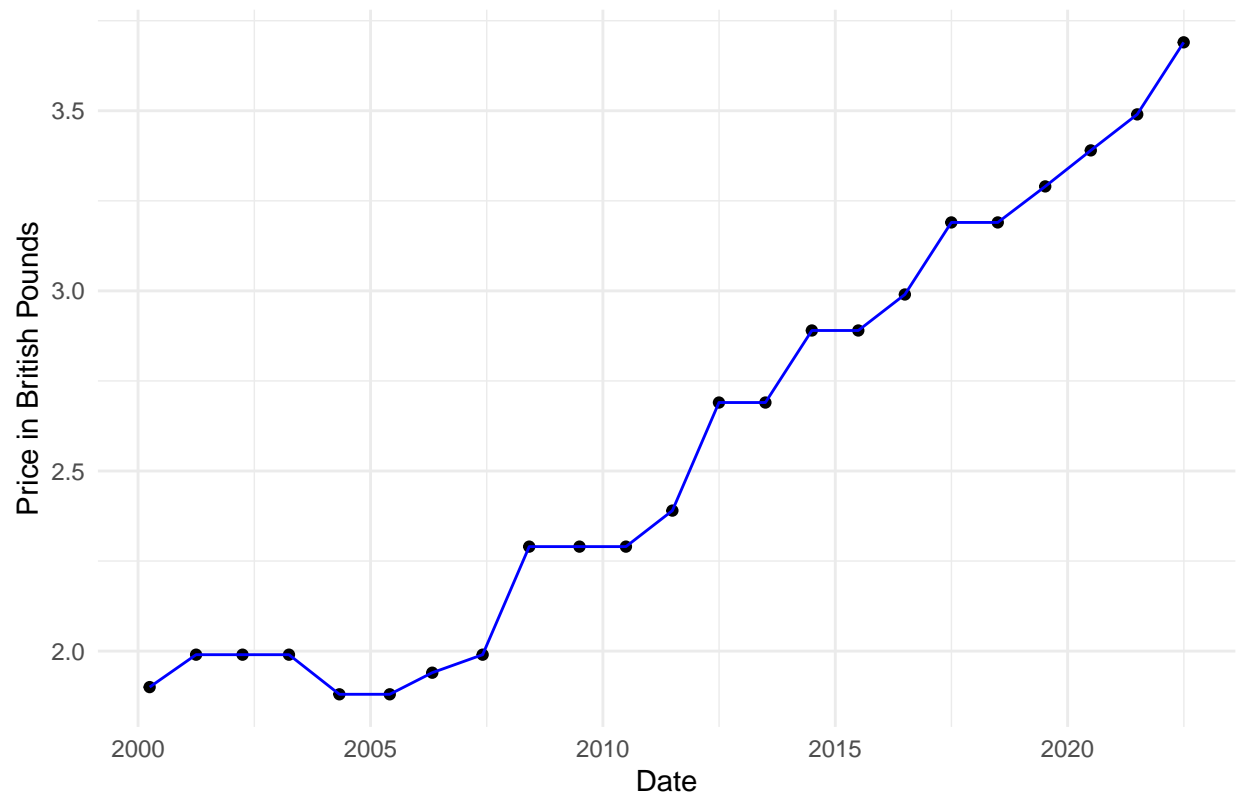


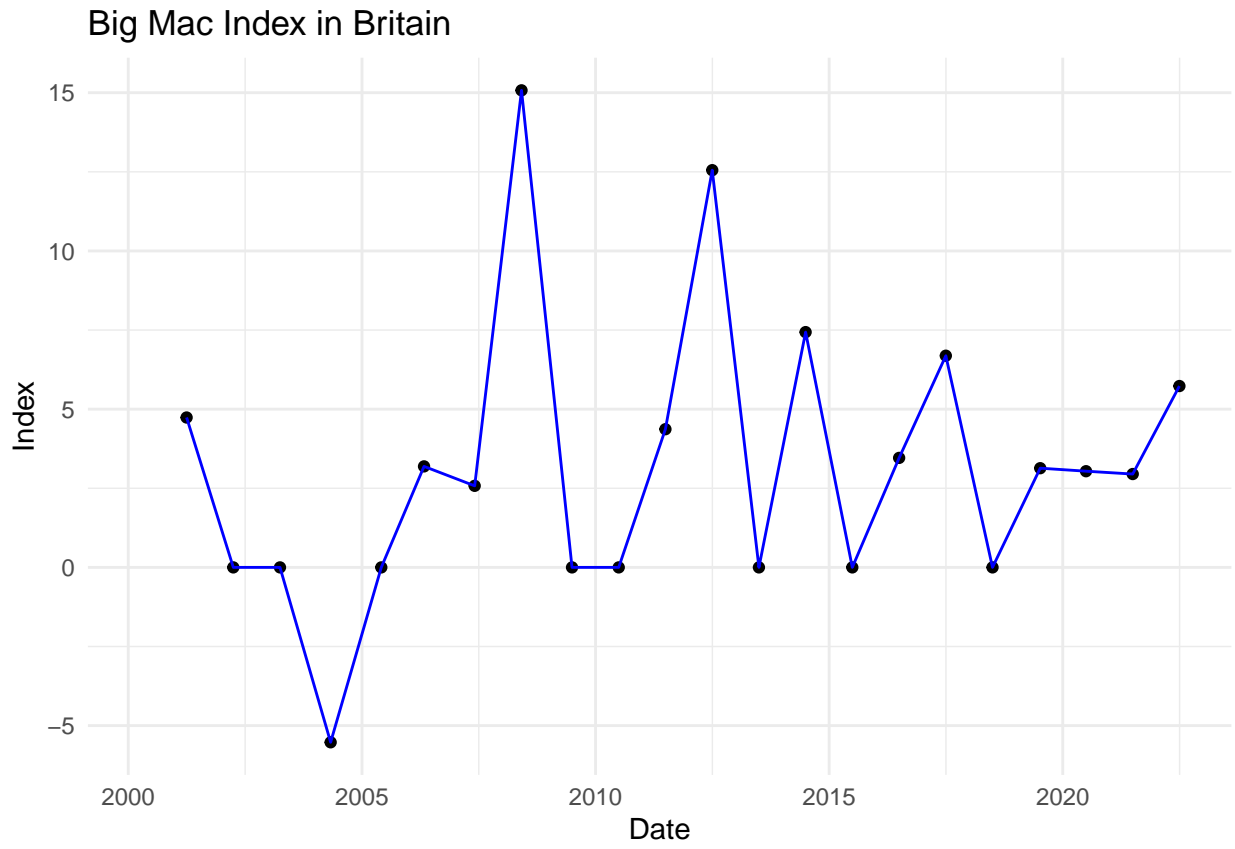
Big Mac Index in Canada



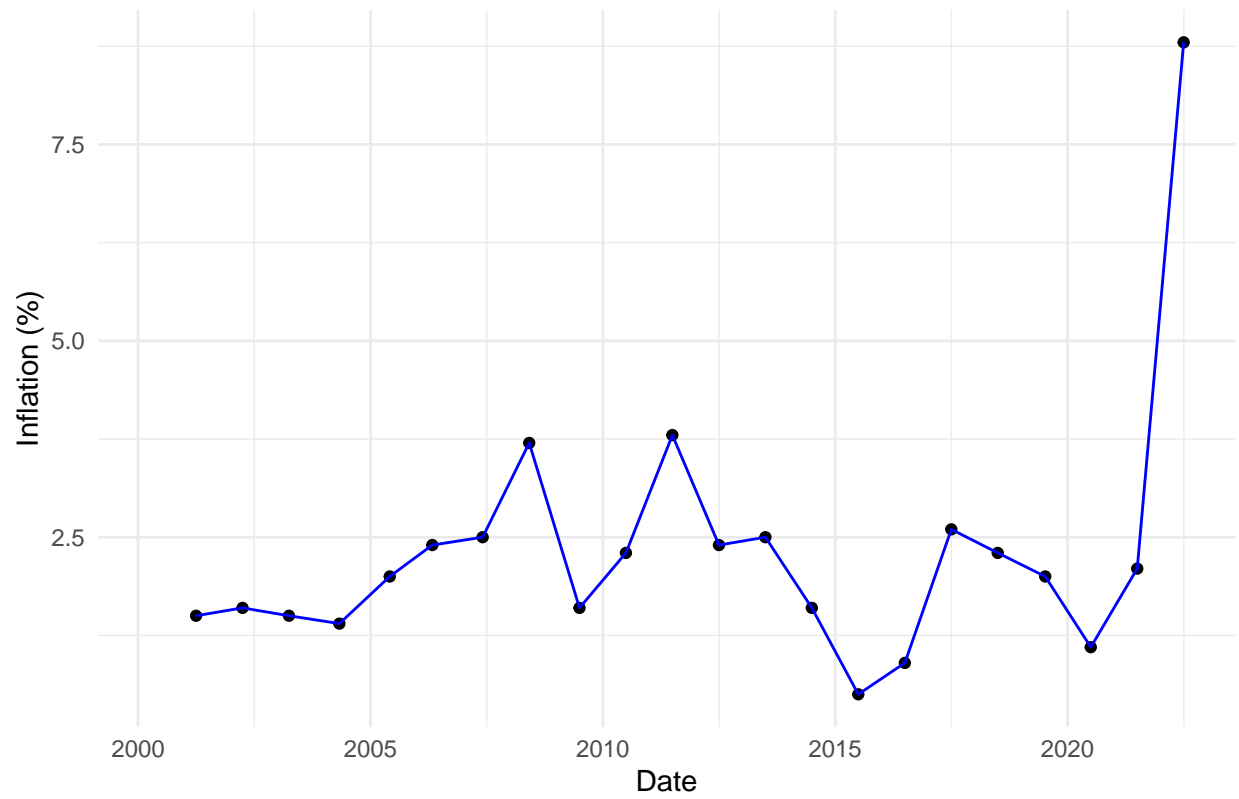


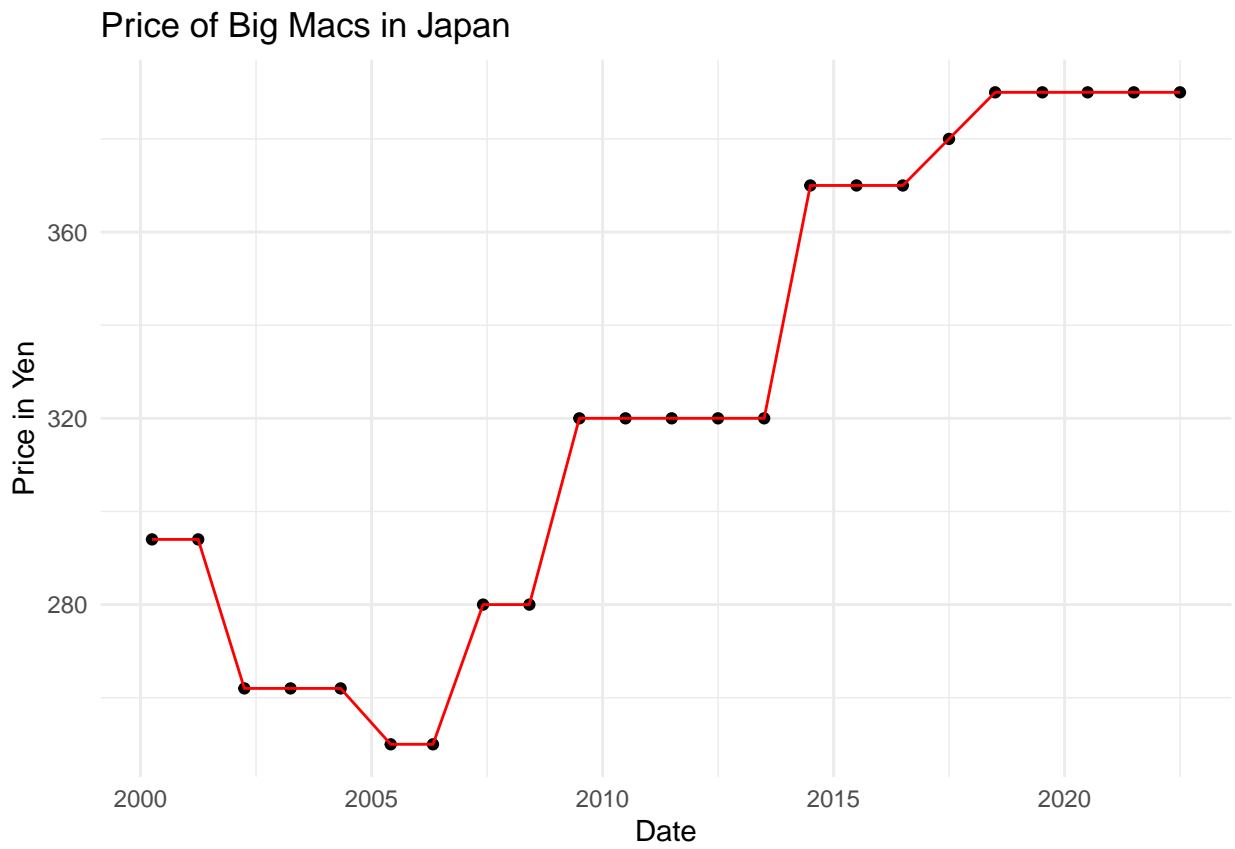
Price of Big Macs in Britain

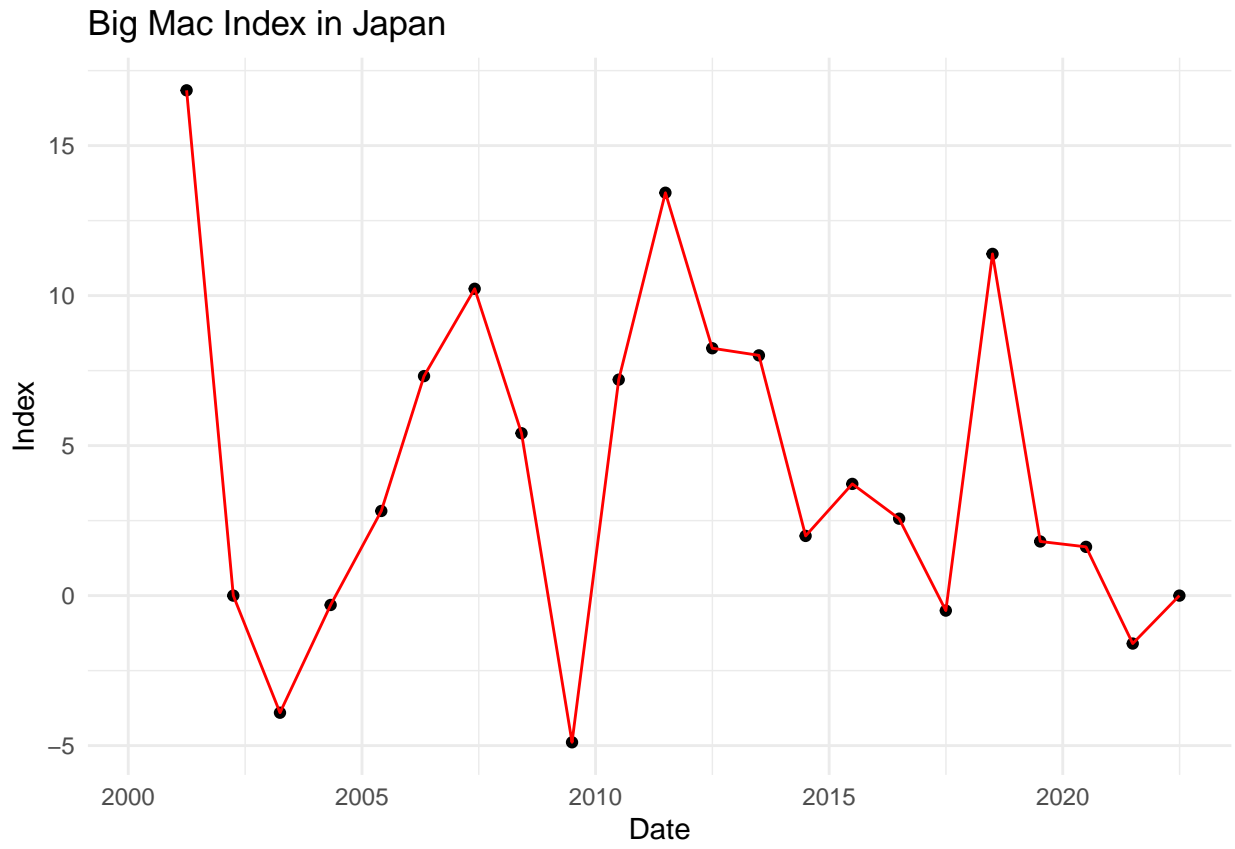


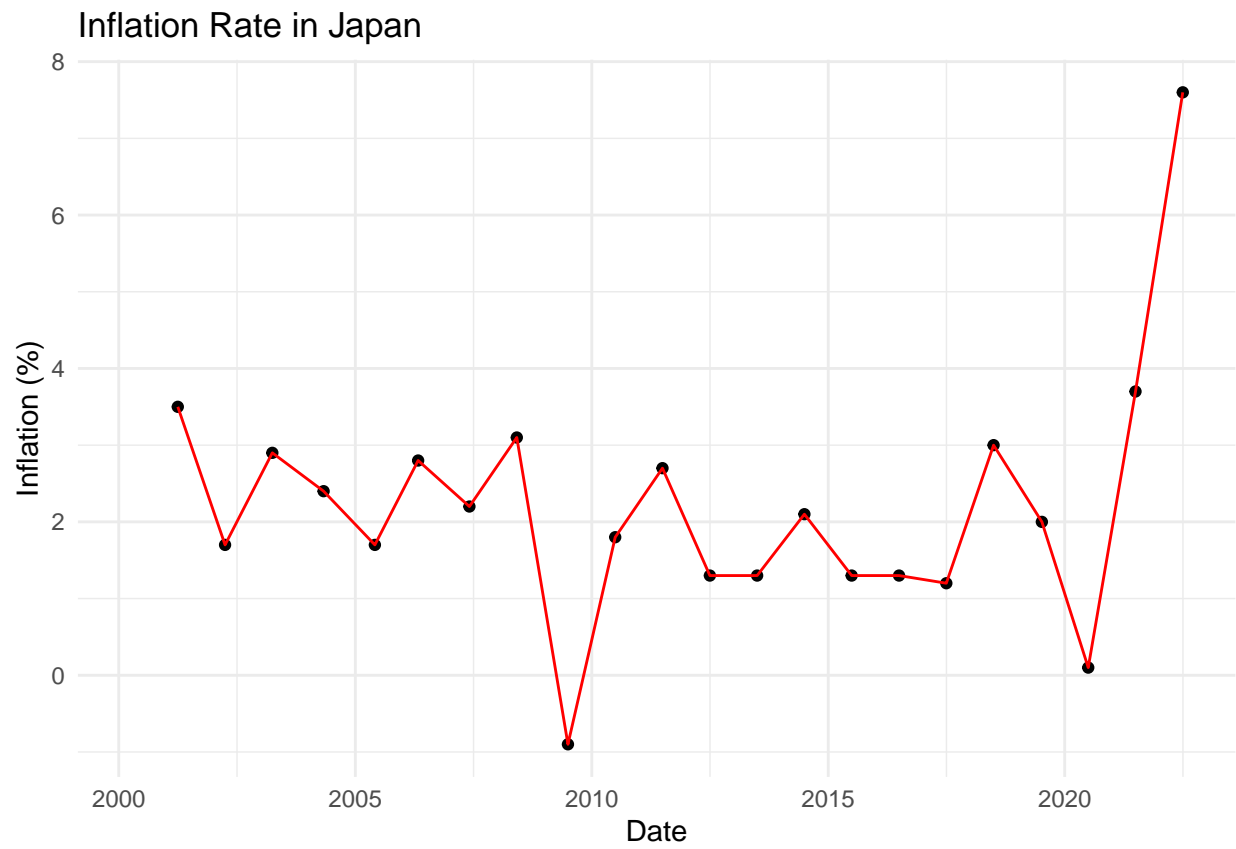


Inflation Rate in Britain





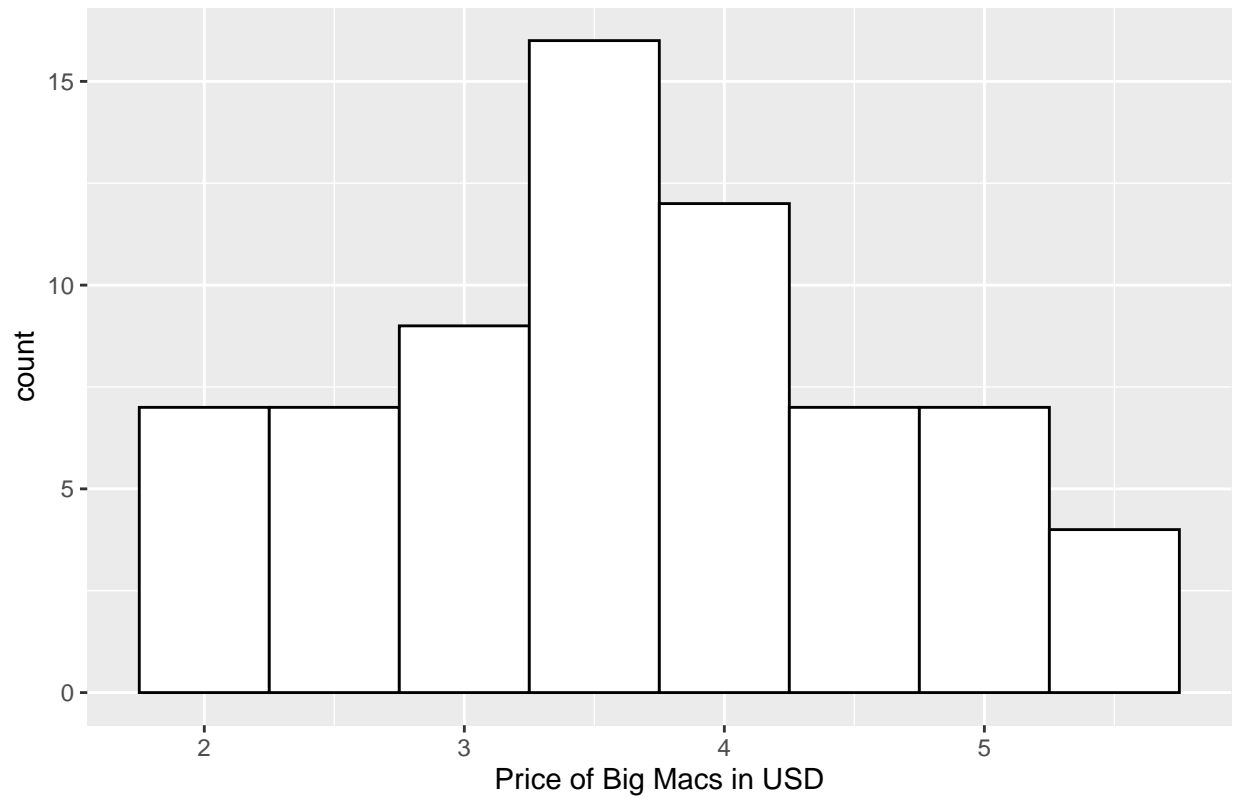




2.2 Summary of variables

2.3 Distributions

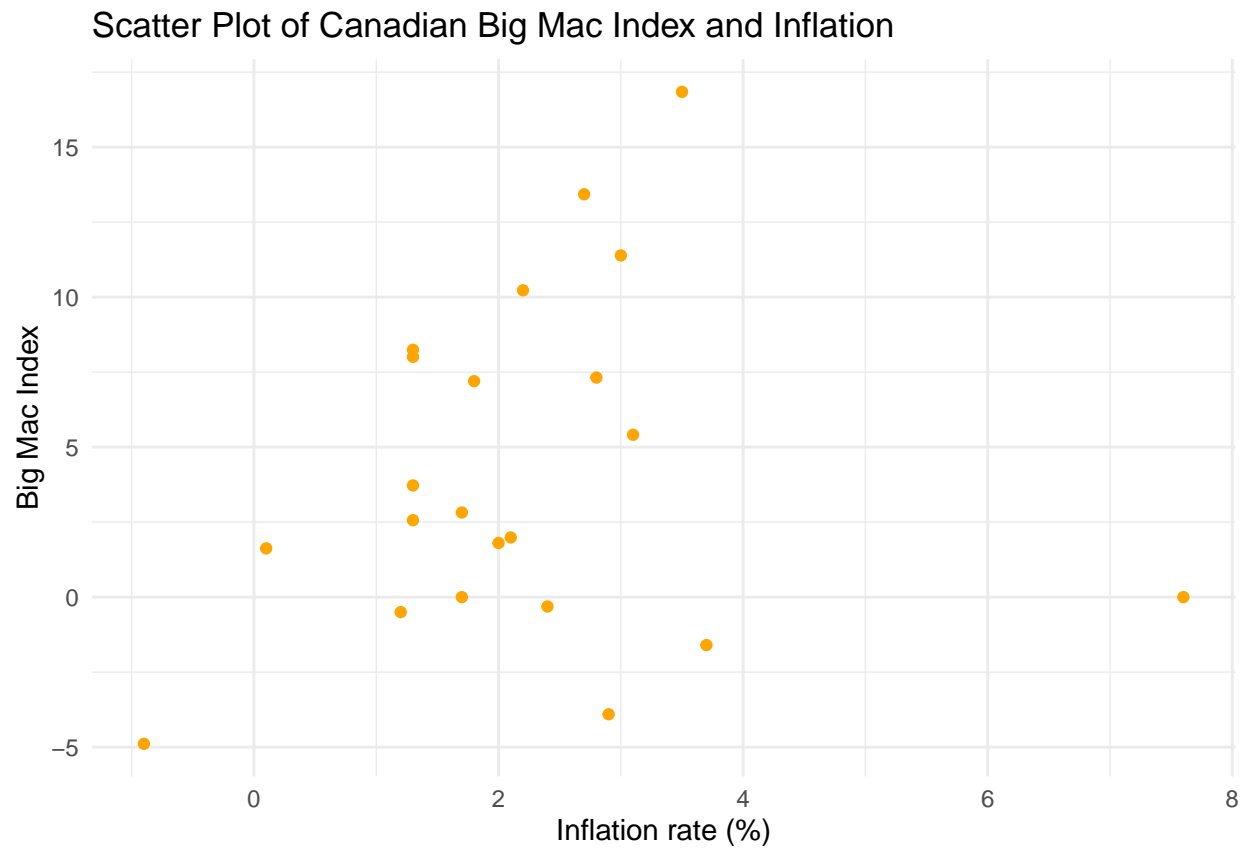
Distribution of Big Mac Prices

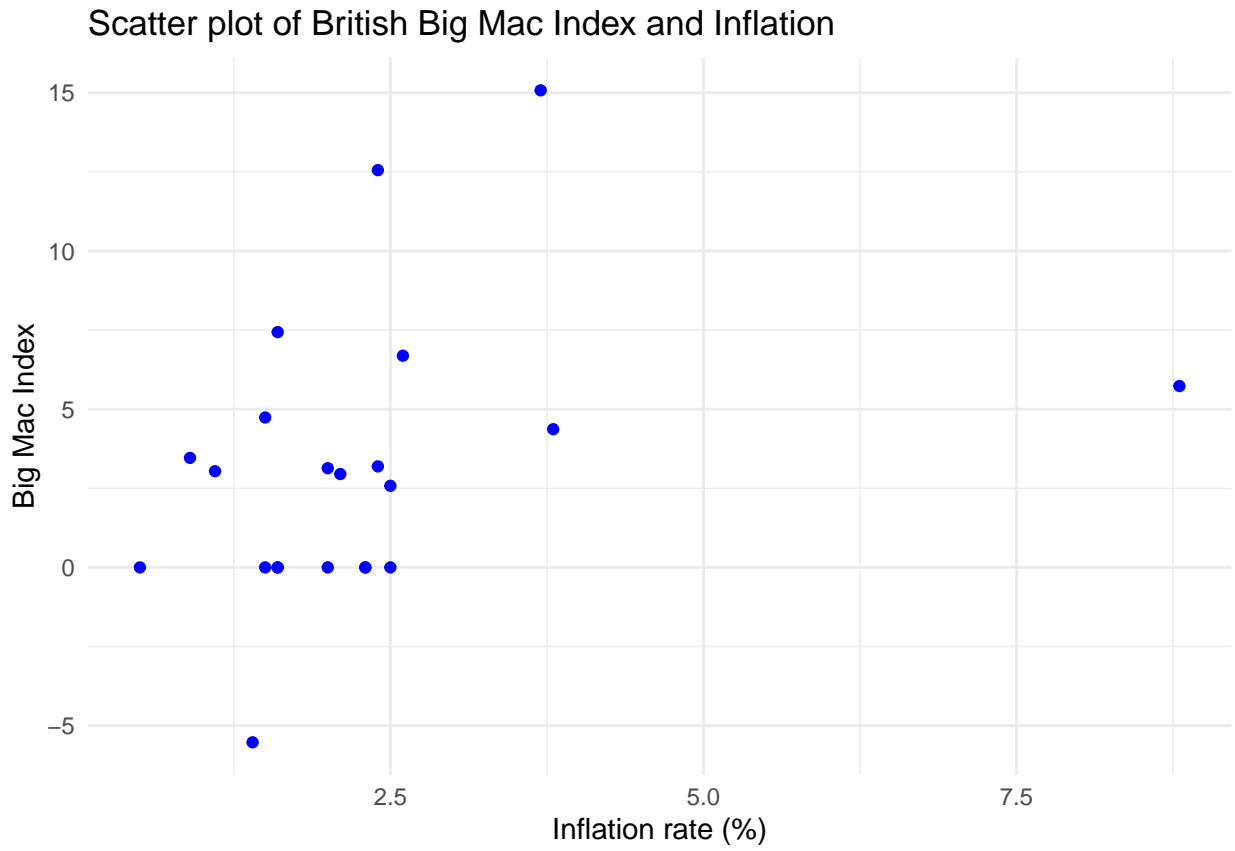


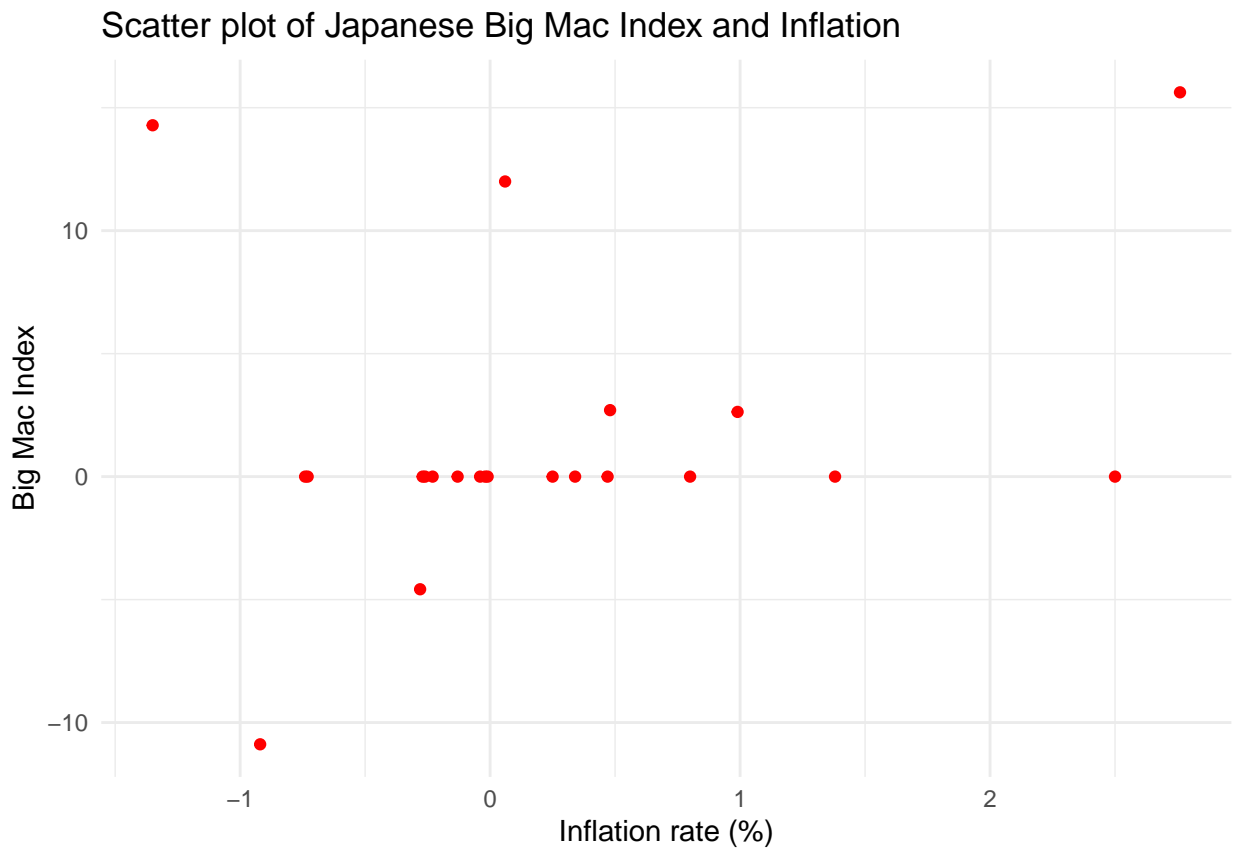
Density Curve of Big Mac Prices



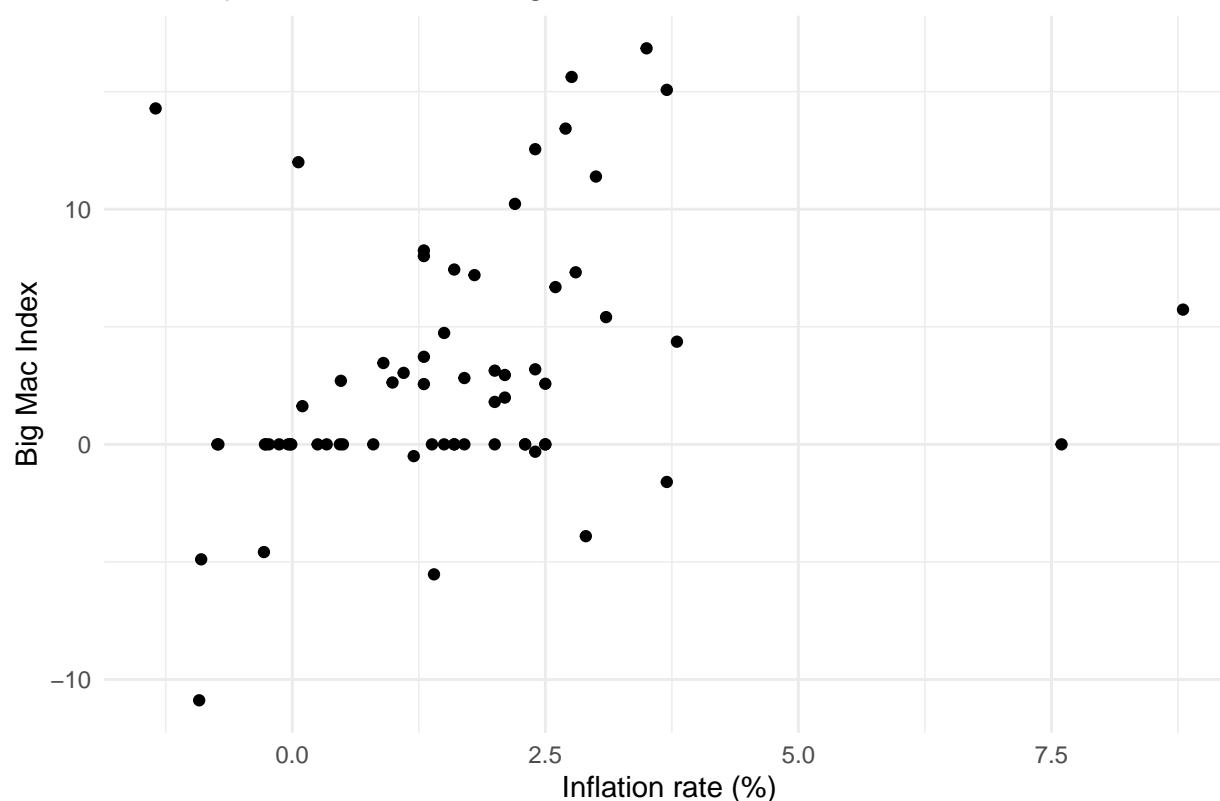
2.4 Scatterplots







Scatter plot of Combined Big Mac Index and Inflation



3 Results

3.1 Pearson's R

```
## [1] 0.1427985
```

```
##      name iso_a3 currency_code local_price dollar_ex GDP_dollar GDP_local
## 1 Britain  GBR           GBP         1.90 0.6329114  28733.21  17755.61
## 2 Britain  GBR           GBP         1.99 0.6993007  28279.66  18654.69
## 3 Britain  GBR           GBP         1.99 0.6896552  27816.75  19319.32
## 4 Britain  GBR           GBP         1.99 0.6329114  30099.60  20050.80
## 5 Britain  GBR           GBP         1.88 0.5586592  34525.00  21127.32
## 6 Britain  GBR           GBP         1.88 0.5464481  40415.48  22064.97
## 7 Britain  GBR           GBP         1.94 0.5318017  42171.20  23168.13
## 8 Britain  GBR           GBP         1.99 0.4966106  44731.56  24277.41
## 9 Britain  GBR           GBP         2.29 0.5010397  50675.53  25317.93
## 10 Britain GBR           GBP         2.29 0.6208866  48038.97  25859.73
## 11 Britain GBR           GBP         2.29 0.6573758  39101.21  25009.56
## 12 Britain GBR           GBP         2.39 0.6141374  39731.62  25688.26
## 13 Britain GBR           GBP         2.69 0.6462662  42281.87  26380.80
## 14 Britain GBR           GBP         2.69 0.6691425  42691.19  27020.72
## 15 Britain GBR           GBP         2.89 0.5867856  43757.45  27971.72
## 16 Britain GBR           GBP         2.89 0.6404509  47816.04  29044.10
## 17 Britain GBR           GBP         2.99 0.7588405  45418.93  29722.19
```

```

## 18 Britain      GBR          GBP          3.19 0.7758855  41630.46  30718.96
## 19 Britain      GBR          GBP          3.19 0.7538636  40903.52  31755.65
## 20 Britain      GBR          GBP          3.29 0.8021819  43718.96  32728.94
## 21 Britain      GBR          GBP          3.39 0.7925500  43121.06  33763.24
## 22 Britain      GBR          GBP          3.49 0.7346729  41127.44  32056.48
## 23 Britain      GBR          GBP          3.69 0.8310800  47202.58  34311.09
##           date big_mac_index inflation_rate
## 1  2000-04-01          NA          NA
## 2  2001-04-01      4.736842          1.5
## 3  2002-04-01      0.000000          1.6
## 4  2003-04-01      0.000000          1.5
## 5  2004-05-01     -5.527638          1.4
## 6  2005-06-01      0.000000          2.0
## 7  2006-05-01      3.191489          2.4
## 8  2007-06-01      2.577320          2.5
## 9  2008-06-01     15.075377          3.7
## 10 2009-07-01      0.000000          1.6
## 11 2010-07-01      0.000000          2.3
## 12 2011-07-01      4.366812          3.8
## 13 2012-07-01     12.552301          2.4
## 14 2013-07-01      0.000000          2.5
## 15 2014-07-01      7.434944          1.6
## 16 2015-07-01      0.000000          0.5
## 17 2016-07-01      3.460208          0.9
## 18 2017-07-01      6.688963          2.6
## 19 2018-07-01      0.000000          2.3
## 20 2019-07-09      3.134796          2.0
## 21 2020-07-01      3.039514          1.1
## 22 2021-07-01      2.949853          2.1
## 23 2022-07-01      5.730659          8.8

```

```
## [1] 0.3418725
```

```

##           name iso_a3 currency_code local_price dollar_ex GDP_dollar GDP_local
## 1  Japan      JPN          JPY          294   106.000   36622.89  4171596
## 2  Japan      JPN          JPY          294   124.000   39172.96  4221494
## 3  Japan      JPN          JPY          262   130.000   34410.68  4181894
## 4  Japan      JPN          JPY          262   120.000   32832.30  4116777
## 5  Japan      JPN          JPY          262   113.000   35410.22  4105230
## 6  Japan      JPN          JPY          250   106.715   38307.10  4144543
## 7  Japan      JPN          JPY          250   112.105   37819.10  4168354
## 8  Japan      JPN          JPY          280   122.315   36021.90  4189322
## 9  Japan      JPN          JPY          280   106.855   35847.23  4221137
## 10 Japan      JPN          JPY          320    92.565   39992.06  4133559
## 11 Japan      JPN          JPY          320    87.180   41469.77  3880330
## 12 Japan      JPN          JPY          320    78.365   45135.80  3962015
## 13 Japan      JPN          JPY          320    78.220   48760.90  3891463
## 14 Japan      JPN          JPY          320   100.105   49175.05  3923700
## 15 Japan      JPN          JPY          370   101.530   40934.76  3995054
## 16 Japan      JPN          JPY          370   123.935   38522.77  4081287
## 17 Japan      JPN          JPY          370   106.725   35005.66  4237225
## 18 Japan      JPN          JPY          380   113.060   39411.42  4287683
## 19 Japan      JPN          JPY          390   111.250   38903.30  4363633
## 20 Japan      JPN          JPY          390   108.765   39826.25  4397741

```

```
## 21 Japan      JPN          JPY          390  107.275  40590.14  4424718
## 22 Japan      JPN          JPY          390  109.935  40048.93  4276208
## 23 Japan      JPN          JPY          390  137.865  39339.84  4317717
```

```
##          date big_mac_index inflation_rate
## 1  2000-04-01          NA          NA
## 2  2001-04-01      0.000000      -0.74
## 3  2002-04-01     -10.884354      -0.92
## 4  2003-04-01      0.000000      -0.26
## 5  2004-05-01      0.000000      -0.01
## 6  2005-06-01     -4.580153      -0.28
## 7  2006-05-01      0.000000       0.25
## 8  2007-06-01     12.000000       0.06
## 9  2008-06-01      0.000000       1.38
## 10 2009-07-01     14.285714     -1.35
## 11 2010-07-01      0.000000     -0.73
## 12 2011-07-01      0.000000     -0.27
## 13 2012-07-01      0.000000     -0.04
## 14 2013-07-01      0.000000       0.34
## 15 2014-07-01     15.625000       2.76
## 16 2015-07-01      0.000000       0.80
## 17 2016-07-01      0.000000     -0.13
## 18 2017-07-01      2.702703       0.48
## 19 2018-07-01      2.631579       0.99
## 20 2019-07-09      0.000000       0.47
## 21 2020-07-01      0.000000     -0.02
## 22 2021-07-01      0.000000     -0.23
## 23 2022-07-01      0.000000       2.50
```

```
## [1] 0.2683515
```

```
##          name iso_a3 currency_code local_price  dollar_ex dollar_price GDP_dollar
## 1  Canada      CAN          CAD         2.85    1.4700000    1.938776    22340.55
## 2  Canada      CAN          CAD         3.33    1.5600000    2.134615    24296.72
## 3  Canada      CAN          CAD         3.33    1.5700000    2.121019    23859.71
## 4  Canada      CAN          CAD         3.20    1.4500000    2.206897    24279.19
## 5  Canada      CAN          CAD         3.19    1.3700000    2.328467    28338.74
## 6  Canada      CAN          CAD         3.28    1.2494000    2.625260    32176.59
## 7  Canada      CAN          CAD         3.52    1.1204500    3.141595    36439.62
## 8  Canada      CAN          CAD         3.88    1.0534500    3.683136    40558.90
## 9  Canada      CAN          CAD         4.09    1.0035500    4.075532    44716.99
## 10 Canada      CAN          CAD         3.89    1.1608500    3.350993    46773.84
## 11 Canada      CAN          CAD         4.17    1.0423500    4.000576    40990.62
## 12 Canada      CAN          CAD         4.73    0.9458500    5.000793    47627.35
## 13 Canada      CAN          CAD         5.12    1.0194500    5.022316    52285.94
## 14 Canada      CAN          CAD         5.53    1.0512500    5.260404    52744.00
## 15 Canada      CAN          CAD         5.64    1.0740500    5.251152    52708.61
## 16 Canada      CAN          CAD         5.85    1.2897000    4.535939    51020.84
## 17 Canada      CAN          CAD         6.00    1.3030000    4.604758    43626.47
## 18 Canada      CAN          CAD         5.97    1.2823000    4.655697    42382.64
## 19 Canada      CAN          CAD         6.65    1.3123500    5.067246    45191.99
## 20 Canada      CAN          CAD         6.77    1.3130500    5.155935    46625.86
## 21 Canada      CAN          CAD         6.88    1.3552000    5.076741    46403.99
## 22 Canada      CAN          CAD         6.77    1.2741000    5.313555    43306.64
## 23 Canada      CAN          CAD         6.77    1.2891500    5.251522    52078.51
```

## 24	Japan	JPN	JPY	294.00	106.0000000	2.773585	36622.89
## 25	Japan	JPN	JPY	294.00	124.0000000	2.370968	39172.96
## 26	Japan	JPN	JPY	262.00	130.0000000	2.015385	34410.68
## 27	Japan	JPN	JPY	262.00	120.0000000	2.183333	32832.30
## 28	Japan	JPN	JPY	262.00	113.0000000	2.318584	35410.22
## 29	Japan	JPN	JPY	250.00	106.7150000	2.342688	38307.10
## 30	Japan	JPN	JPY	250.00	112.1050000	2.230052	37819.10
## 31	Japan	JPN	JPY	280.00	122.3150000	2.289171	36021.90
## 32	Japan	JPN	JPY	280.00	106.8550000	2.620373	35847.23
## 33	Japan	JPN	JPY	320.00	92.5650000	3.457030	39992.06
## 34	Japan	JPN	JPY	320.00	87.1800000	3.670567	41469.77
## 35	Japan	JPN	JPY	320.00	78.3650000	4.083456	45135.80
## 36	Japan	JPN	JPY	320.00	78.2200000	4.091025	48760.90
## 37	Japan	JPN	JPY	320.00	100.1050000	3.196644	49175.05
## 38	Japan	JPN	JPY	370.00	101.5300000	3.644243	40934.76
## 39	Japan	JPN	JPY	370.00	123.9350000	2.985436	38522.77
## 40	Japan	JPN	JPY	370.00	106.7250000	3.466854	35005.66
## 41	Japan	JPN	JPY	380.00	113.0600000	3.361047	39411.42
## 42	Japan	JPN	JPY	390.00	111.2500000	3.505618	38903.30
## 43	Japan	JPN	JPY	390.00	108.7650000	3.585712	39826.25
## 44	Japan	JPN	JPY	390.00	107.2750000	3.635516	40590.14
## 45	Japan	JPN	JPY	390.00	109.9350000	3.547551	40048.93
## 46	Japan	JPN	JPY	390.00	137.8650000	2.828854	39339.84
## 47	Britain	GBR	GBP	1.90	0.6329114	3.002000	28733.21
## 48	Britain	GBR	GBP	1.99	0.6993007	2.845700	28279.66
## 49	Britain	GBR	GBP	1.99	0.6896552	2.885500	27816.75
## 50	Britain	GBR	GBP	1.99	0.6329114	3.144200	30099.60
## 51	Britain	GBR	GBP	1.88	0.5586592	3.365200	34525.00
## 52	Britain	GBR	GBP	1.88	0.5464481	3.440400	40415.48
## 53	Britain	GBR	GBP	1.94	0.5318017	3.647976	42171.20
## 54	Britain	GBR	GBP	1.99	0.4966106	4.007164	44731.56
## 55	Britain	GBR	GBP	2.29	0.5010397	4.570497	50675.53
## 56	Britain	GBR	GBP	2.29	0.6208866	3.688274	48038.97
## 57	Britain	GBR	GBP	2.29	0.6573758	3.483548	39101.21
## 58	Britain	GBR	GBP	2.39	0.6141374	3.891637	39731.62
## 59	Britain	GBR	GBP	2.69	0.6462662	4.162371	42281.87
## 60	Britain	GBR	GBP	2.69	0.6691425	4.020070	42691.19
## 61	Britain	GBR	GBP	2.89	0.5867856	4.925138	43757.45
## 62	Britain	GBR	GBP	2.89	0.6404509	4.512446	47816.04
## 63	Britain	GBR	GBP	2.99	0.7588405	3.940222	45418.93
## 64	Britain	GBR	GBP	3.19	0.7758855	4.111432	41630.46
## 65	Britain	GBR	GBP	3.19	0.7538636	4.231535	40903.52
## 66	Britain	GBR	GBP	3.29	0.8021819	4.101314	43718.96
## 67	Britain	GBR	GBP	3.39	0.7925500	4.277332	43121.06
## 68	Britain	GBR	GBP	3.49	0.7346729	4.750413	41127.44
## 69	Britain	GBR	GBP	3.69	0.8310800	4.440006	47202.58
##	GDP_local	date	big_mac_index	inflation_rate			
## 1	33191.47	2000-04-01	NA	NA			
## 2	36090.21	2001-04-01	16.842105	3.50			
## 3	36954.88	2002-04-01	0.000000	1.70			
## 4	38126.65	2003-04-01	-3.903904	2.90			
## 5	39702.99	2004-05-01	-0.312500	2.40			
## 6	41870.81	2005-06-01	2.821317	1.70			
## 7	44143.14	2006-05-01	7.317073	2.80			

## 8	46007.77	2007-06-01	10.227273	2.20
## 9	48028.08	2008-06-01	5.412371	3.10
## 10	49911.75	2009-07-01	-4.889976	-0.90
## 11	46792.25	2010-07-01	7.197943	1.80
## 12	49061.54	2011-07-01	13.429257	2.70
## 13	51724.29	2012-07-01	8.245243	1.30
## 14	52710.50	2013-07-01	8.007812	1.30
## 15	54297.11	2014-07-01	1.989150	2.10
## 16	56365.13	2015-07-01	3.723404	1.30
## 17	55788.93	2016-07-01	2.564103	1.30
## 18	56183.06	2017-07-01	-0.500000	1.20
## 19	58656.31	2018-07-01	11.390285	3.00
## 20	60418.62	2019-07-09	1.804511	2.00
## 21	61568.50	2020-07-01	1.624815	0.10
## 22	58080.81	2021-07-01	-1.598837	3.70
## 23	65300.05	2022-07-01	0.000000	7.60
## 24	4171595.82	2000-04-01	NA	NA
## 25	4221493.90	2001-04-01	0.000000	-0.74
## 26	4181893.67	2002-04-01	-10.884354	-0.92
## 27	4116776.51	2003-04-01	0.000000	-0.26
## 28	4105229.71	2004-05-01	0.000000	-0.01
## 29	4144543.14	2005-06-01	-4.580153	-0.28
## 30	4168353.53	2006-05-01	0.000000	0.25
## 31	4189322.19	2007-06-01	12.000000	0.06
## 32	4221137.33	2008-06-01	0.000000	1.38
## 33	4133559.05	2009-07-01	14.285714	-1.35
## 34	3880330.35	2010-07-01	0.000000	-0.73
## 35	3962014.51	2011-07-01	0.000000	-0.27
## 36	3891462.54	2012-07-01	0.000000	-0.04
## 37	3923699.99	2013-07-01	0.000000	0.34
## 38	3995054.42	2014-07-01	15.625000	2.76
## 39	4081286.51	2015-07-01	0.000000	0.80
## 40	4237225.49	2016-07-01	0.000000	-0.13
## 41	4287683.07	2017-07-01	2.702703	0.48
## 42	4363632.78	2018-07-01	2.631579	0.99
## 43	4397740.89	2019-07-09	0.000000	0.47
## 44	4424717.81	2020-07-01	0.000000	-0.02
## 45	4276207.75	2021-07-01	0.000000	-0.23
## 46	4317717.14	2022-07-01	0.000000	2.50
## 47	17755.61	2000-04-01	NA	NA
## 48	18654.69	2001-04-01	4.736842	1.50
## 49	19319.32	2002-04-01	0.000000	1.60
## 50	20050.80	2003-04-01	0.000000	1.50
## 51	21127.32	2004-05-01	-5.527638	1.40
## 52	22064.97	2005-06-01	0.000000	2.00
## 53	23168.13	2006-05-01	3.191489	2.40
## 54	24277.41	2007-06-01	2.577320	2.50
## 55	25317.93	2008-06-01	15.075377	3.70
## 56	25859.73	2009-07-01	0.000000	1.60
## 57	25009.56	2010-07-01	0.000000	2.30
## 58	25688.26	2011-07-01	4.366812	3.80
## 59	26380.80	2012-07-01	12.552301	2.40
## 60	27020.72	2013-07-01	0.000000	2.50
## 61	27971.72	2014-07-01	7.434944	1.60

```

## 62 29044.10 2015-07-01 0.000000 0.50
## 63 29722.19 2016-07-01 3.460208 0.90
## 64 30718.96 2017-07-01 6.688963 2.60
## 65 31755.65 2018-07-01 0.000000 2.30
## 66 32728.94 2019-07-09 3.134796 2.00
## 67 33763.24 2020-07-01 3.039514 1.10
## 68 32056.48 2021-07-01 2.949853 2.10
## 69 34311.09 2022-07-01 5.730659 8.80

## [1] 0.2953589

##
## Call:
## lm(formula = inflation_rate ~ big_mac_index, data = canada_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.7481 -0.8468 -0.1944  0.4774  5.5518
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   2.04822    0.43711   4.686 0.000142 ***
## big_mac_index  0.04091    0.06341   0.645 0.526114
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.636 on 20 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.02039, Adjusted R-squared: -0.02859
## F-statistic: 0.4163 on 1 and 20 DF, p-value: 0.5261

##
## Call:
## lm(formula = inflation_rate ~ big_mac_index, data = britain_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.4608 -0.8724 -0.1806  0.2276  6.1555
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.92858    0.41619   4.634 0.00016 ***
## big_mac_index  0.12492    0.07679   1.627 0.11941
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.587 on 20 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.1169, Adjusted R-squared:  0.07272
## F-statistic: 2.647 on 1 and 20 DF, p-value: 0.1194

##
## Call:

```



```
## lm(formula = inflation_rate ~ big_mac_index, data = japan_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1751 -0.4300 -0.1925  0.2786  2.3375
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.16255    0.21676   0.750   0.462
## big_mac_index  0.04638    0.03723   1.246   0.227
##
## Residual standard error: 0.9849 on 20 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.07201,    Adjusted R-squared:  0.02561
## F-statistic: 1.552 on 1 and 20 DF,  p-value: 0.2272

##
## Call:
## lm(formula = inflation_rate ~ big_mac_index, data = combined_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.0195 -1.0406 -0.0749  0.6418  6.9428
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.31310    0.23331   5.628 4.33e-07 ***
## big_mac_index  0.09495    0.03839   2.473  0.0161 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.663 on 64 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.08724,    Adjusted R-squared:  0.07297
## F-statistic: 6.117 on 1 and 64 DF,  p-value: 0.01606
```

4 Discussion

4.0.1 Pearson's r

Simple Linear Regression

Canada, Bank of. 2023. “Key Inflation Indicators and the Target Range.” 2023. <https://www.bankofcanada.ca/rates/indicators/key-variables/key-inflation-indicators-and-the-target-range/>.

Economist, The. 2023. “Our Big Mac Index Shows How Burger Prices Are Changing.” 2023. <https://www.economist.com/big-mac-index>.

futuraprime. 2022. “TheEconomist/Big-Mac-Data.” 2022. <https://github.com/TheEconomist/big-mac-data>.

Kenneth W. Clements, Yihui Lan, and Shi Pei Seah. 2012. “The Big Mac Index Two Decades on: An Evaluation of Burgernomics.” *International Journal of Finance and Economics* 17 (1): 31–60.

macrotrends. 2023. “Japan Inflation Rate 1960-2023.” 2023. <https://www.macrotrends.net/countries/JPN/japan/inflation-rate-cpi>.

National Statistics, Office for. 2023. "CPIH Annual Rate 00: All Items 2015=100." 2023. <https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/l55o/mm23>.

Reuters. 2022. "Currencies." 2022. <https://www.reuters.com/markets/currencies/>.