In [1]:
```
pip install pandas-datareader
```

```
Requirement already satisfied: pandas-datareader in /opt/anaconda3/l
ib/python3.7/site-packages (0.8.1)
Requirement already satisfied: requests>=2.3.0 in /opt/anaconda3/lib
/python3.7/site-packages (from pandas-datareader) (2.22.0)
Requirement already satisfied: pandas>=0.21 in /opt/anaconda3/lib/py
thon3.7/site-packages (from pandas-datareader) (1.0.1)
Requirement already satisfied: lxml in /opt/anaconda3/lib/python3.7/
site-packages (from pandas-datareader) (4.5.0)
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in /opt/anacond
a3/lib/python3.7/site-packages (from requests>=2.3.0->pandas-datarea
der) (3.0.4)
Requirement already satisfied: idna<2.9,>=2.5 in /opt/anaconda3/lib/
python3.7/site-packages (from requests>=2.3.0->pandas-datareader) (2
.8)
Requirement already satisfied: certifi>=2017.4.17 in /opt/anaconda3/
lib/python3.7/site-packages (from requests>=2.3.0->pandas-datareader
) (2019.11.28)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21
.1 in /opt/anaconda3/lib/python3.7/site-packages (from requests>=2.3
.0->pandas-datareader) (1.25.8)
Requirement already satisfied: numpy>=1.13.3 in /opt/anaconda3/lib/p
ython3.7/site-packages (from pandas>=0.21->pandas-datareader) (1.18.
1)
Requirement already satisfied: pytz>=2017.2 in /opt/anaconda3/lib/py
thon3.7/site-packages (from pandas>=0.21->pandas-datareader) (2019.3
)
Requirement already satisfied: python-dateutil>=2.6.1 in /opt/anacon
da3/lib/python3.7/site-packages (from pandas>=0.21->pandas-datareade
r) (2.8.1)
Requirement already satisfied: six>=1.5 in /opt/anaconda3/lib/python
3.7/site-packages (from python-dateutil>=2.6.1->pandas>=0.21->pandas
-datareader) (1.14.0)
Note: you may need to restart the kernel to use updated packages.
```

In [2]:
```
#importing required packages
import pandas as pd
import numpy as np
import pandas_datareader as pdr
import datetime
import matplotlib.pyplot as plt
```

```
/opt/anaconda3/lib/python3.7/site-packages/pandas_datareader/compat/
__init__.py:7: FutureWarning: pandas.util.testing is deprecated. Use
the functions in the public API at pandas.testing instead.
  from pandas.util.testing import assert_frame_equal
```

In [3]:
```
#downloading the dataset
forex=pd.read_csv('~/Desktop/project/Foreign_Exchange_Rates.csv')
```

In [4]:
```
#renaming a column
forex.rename( columns={'Unnamed: 0':'Index'}, inplace=True )
```

In [5]:
```
#summary of the dataset
forex.head(40)
```

Out[5]:

	Index	Time Serie	AUSTRALIA - AUSTRALIAN DOLLAR/US$	EURO AREA - EURO/US$	NEW ZEALAND - NEW ZELAND DOLLAR/US$	UNITED KINGDOM - UNITED KINGDOM POUND/US$	BRAZIL - REAL/US$	CANAD CANADI DOLLAR/U
0	0	2000-01-03	1.5172	0.9847	1.9033	0.6146	1.805	1.4
1	1	2000-01-04	1.5239	0.97	1.9238	0.6109	1.8405	1.4
2	2	2000-01-05	1.5267	0.9676	1.9339	0.6092	1.856	1.4
3	3	2000-01-06	1.5291	0.9686	1.9436	0.607	1.84	1.4
4	4	2000-01-07	1.5272	0.9714	1.938	0.6104	1.831	1.4
5	5	2000-01-10	1.5242	0.9754	1.935	0.6107	1.819	1.4
6	6	2000-01-11	1.5209	0.9688	1.9365	0.6068	1.8225	1.
7	7	2000-01-12	1.5202	0.9727	1.9286	0.6073	1.835	1.
8	8	2000-01-13	1.4954	0.9737	1.9084	0.6067	1.814	1.4
9	9	2000-01-14	1.5004	0.9874	1.9186	0.6115	1.805	1.4
10	10	2000-01-17	ND	ND	ND	ND	ND	
11	11	2000-01-18	1.506	0.988	1.9342	0.6105	1.7942	1.4
12	12	2000-01-19	1.5074	0.9886	1.9399	0.6083	1.793	1.4
13	13	2000-01-20	1.5002	0.9869	1.9486	0.6047	1.7785	1.4

14	14	2000-01-21	1.5103	0.9901	1.9592	0.6059	1.78	1.4
15	15	2000-01-24	1.5281	0.9981	1.9759	0.6053	1.768	1
16	16	2000-01-25	1.5286	0.9959	1.9732	0.6067	1.78	1.43
17	17	2000-01-26	1.5373	0.9989	1.9763	0.6099	1.781	1.43
18	18	2000-01-27	1.5267	1.0111	1.9716	0.6111	1.78	1.4
19	19	2000-01-28	1.5962	1.0241	2.0534	0.6169	1.79	1.44
20	20	2000-01-31	1.5669	1.0249	2.019	0.618	1.802	1.45
21	21	2000-02-01	1.5835	1.0276	2.0392	0.6192	1.795	1.44
22	22	2000-02-02	1.5723	1.0238	2.0416	0.6227	1.785	1.44
23	23	2000-02-03	1.5657	1.0114	2.0133	0.624	1.775	1.44
24	24	2000-02-04	1.5835	1.0246	2.0284	0.6283	1.773	1.44
25	25	2000-02-07	1.5775	1.0222	2.0259	0.6283	1.77	1.44
26	26	2000-02-08	1.5741	1.014	2.0243	0.6209	1.765	1.44
27	27	2000-02-09	1.576	1.0087	2.0325	0.6205	1.77	1.44
28	28	2000-02-10	1.5823	1.0137	2.0263	0.6228	1.77	1
29	29	2000-02-11	1.5918	1.0155	2.0346	0.628	1.767	1.45
30	30	2000-02-14	1.5926	1.0222	2.0542	0.6293	1.769	1.45
31	31	2000-02-15	1.5873	1.0169	2.0534	0.627	1.783	1.45
32	32	2000-02-16	1.587	1.0161	2.0412	0.6234	1.775	1.4
33	33	2000-02-17	1.5823	1.0139	2.0255	0.6231	1.777	1.45
34	34	2000-02-18	1.5893	1.0152	2.0371	0.6256	1.777	1.45
35	35	2000-	ND	ND	ND	ND	ND	

		02-21						
36	36	2000-02-22	1.5982	0.994	2.0338	0.6186	1.785	1.4
37	37	2000-02-23	1.6139	0.9983	2.0597	0.6232	1.79	1.4
38	38	2000-02-24	1.6276	1.0069	2.0547	0.6257	1.782	1.4
39	39	2000-02-25	1.6194	1.0243	2.0483	0.6286	1.774	1.4

40 rows × 24 columns

In [6]:
```
#checking for duplicates
duplicate_in_TimeSerie= forex.duplicated(subset=['Time Serie'])
if duplicate_in_TimeSerie.any():
    print(forex.loc[~duplicate_in_TimeSerie],end='\n\n')
```

In [7]:
```
#removing any duplicates
forex.drop_duplicates(subset=['Time Serie'], inplace=True)
print(forex)
```

```
      Index  Time Serie AUSTRALIA - AUSTRALIAN DOLLAR/US$  \
0         0  2000-01-03                             1.5172
1         1  2000-01-04                             1.5239
2         2  2000-01-05                             1.5267
3         3  2000-01-06                             1.5291
4         4  2000-01-07                             1.5272
...     ...         ...                                ...
5212   5212  2019-12-25                                 ND
5213   5213  2019-12-26                             1.4411
5214   5214  2019-12-27                             1.4331
5215   5215  2019-12-30                             1.4278
5216   5216  2019-12-31                             1.4225

     EURO AREA - EURO/US$ NEW ZEALAND - NEW ZELAND DOLLAR/US$  \
0                  0.9847                                1.9033
1                    0.97                                1.9238
2                  0.9676                                1.9339
3                  0.9686                                1.9436
4                  0.9714                                 1.938
...                   ...                                   ...
5212                  ND                                    ND
5213               0.9007                                1.5002
5214               0.8949                                1.4919
5215               0.8915                                1.4846
5216               0.8907                                1.4826
```

	UNITED KINGDOM - UNITED KINGDOM POUND/US$	BRAZIL - REAL/US$
0	0.6146	1.805
1	0.6109	1.8405
2	0.6092	1.856
3	0.607	1.84
4	0.6104	1.831
...	...	...
5212	ND	ND
5213	0.7688	4.0602
5214	0.7639	4.0507
5215	0.761	4.0152
5216	0.7536	4.019

	CANADA - CANADIAN DOLLAR/US$	CHINA - YUAN/US$
0	1.4465	8.2798
1	1.4518	8.2799
2	1.4518	8.2798
3	1.4571	8.2797
4	1.4505	8.2794
...	...	...
5212	ND	ND
5213	1.3124	6.9949
5214	1.3073	6.9954
5215	1.3058	6.9864
5216	1.2962	6.9618

	HONG KONG - HONG KONG DOLLAR/US$	...	SINGAPORE - SINGAPORE DOLLAR/US$
0	7.7765	...	1.6563
1	7.7775	...	1.6535
2	7.778	...	1.656
3	7.7785	...	1.6655
4	7.7783	...	1.6625
...	...	...	...
5212	ND	...	ND
5213	7.788	...	1.354
5214	7.7874	...	1.352
5215	7.7857	...	1.3483
5216	7.7894	...	1.3446

	DENMARK - DANISH KRONE/US$	JAPAN - YEN/US$	MALAYSIA - RINGGIT/US$
0	7.329	101.7	3.8
1	7.218	103.09	3.8
2	7.208	103.77	3.8
3	7.2125	105.19	3.8
4	7.2285	105.17	3.8
...	...	...	...
5212	ND	ND	ND
5213	6.7295	109.67	4.1337
5214	6.6829	109.47	4.126
5215	6.6589	108.85	4.1053
5216	6.6554	108.67	4.0918

	NORWAY - NORWEGIAN KRONE/US$	SWEDEN - KRONA/US$
0	7.964	8.443
1	7.934	8.36
2	7.935	8.353
3	7.94	8.3675
4	7.966	8.415
...	...	...
5212	ND	ND
5213	8.8799	9.4108
5214	8.8291	9.3405
5215	8.7839	9.3145
5216	8.7823	9.3425

	SRI LANKA - SRI LANKAN RUPEE/US$	SWITZERLAND - FRANC/US$
0	72.3	1.5808
1	72.65	1.5565
2	72.95	1.5526
3	72.95	1.554
4	73.15	1.5623
...	...	...
5212	ND	ND
5213	181.3	0.9808
5214	181.35	0.9741
5215	181.6	0.9677

```
5216                                181.3                    0.9677

     TAIWAN - NEW TAIWAN DOLLAR/US$ THAILAND - BAHT/US$
0                                 31.38                 36.97
1                                  30.6                 37.13
2                                  30.8                  37.1
3                                 31.75                 37.62
4                                 30.85                  37.3
...                                 ...                   ...
5212                                ND                    ND
5213                              30.11                 30.15
5214                              30.09                 30.14
5215                              30.04                 29.94
5216                              29.91                 29.75

[5217 rows x 24 columns]
```

In [8]:
```
forex.head()
```

Out[8]:

	Index	Time Serie	AUSTRALIA - AUSTRALIAN DOLLAR/US$	EURO AREA - EURO/US$	NEW ZEALAND - NEW ZELAND DOLLAR/US$	UNITED KINGDOM - UNITED KINGDOM POUND/US$	BRAZIL - REAL/US$	CANADA CANADIA DOLLAR/US
0	0	2000-01-03	1.5172	0.9847	1.9033	0.6146	1.805	1.44
1	1	2000-01-04	1.5239	0.97	1.9238	0.6109	1.8405	1.45
2	2	2000-01-05	1.5267	0.9676	1.9339	0.6092	1.856	1.45
3	3	2000-01-06	1.5291	0.9686	1.9436	0.607	1.84	1.45
4	4	2000-01-07	1.5272	0.9714	1.938	0.6104	1.831	1.45

5 rows × 24 columns

In [121]:
```
#Changing Time Serie to datetime
forex["Time Serie"]= pd.to_datetime(forex["Time Serie"])

#Sorting by date
forex.sort_values('Time Serie',inplace=True)
```

In [10]:
```
forex["AUSTRALIA - AUSTRALIAN DOLLAR/US$"]= pd.to_numeric(forex["AUSTR
ALIA - AUSTRALIAN DOLLAR/US$"],errors="coerce")
```

```
forex["EURO AREA - EURO/US$"]= pd.to_numeric(forex["EURO AREA - EURO/U
S$"],errors="coerce")

forex["NEW ZEALAND - NEW ZELAND DOLLAR/US$"]= pd.to_numeric(forex["NEW
ZEALAND - NEW ZELAND DOLLAR/US$"],errors="coerce")

forex["UNITED KINGDOM - UNITED KINGDOM POUND/US$"]= pd.to_numeric(fore
x["UNITED KINGDOM - UNITED KINGDOM POUND/US$"],errors="coerce")

forex["BRAZIL - REAL/US$"]= pd.to_numeric(forex["BRAZIL - REAL/US$"],e
rrors="coerce")

forex["CANADA - CANADIAN DOLLAR/US$"]= pd.to_numeric(forex["CANADA - C
ANADIAN DOLLAR/US$"],errors="coerce")

forex["CHINA - YUAN/US$"]= pd.to_numeric(forex["CHINA - YUAN/US$"],err
ors="coerce")

forex["HONG KONG - HONG KONG DOLLAR/US$"]= pd.to_numeric(forex["HONG K
ONG - HONG KONG DOLLAR/US$"],errors="coerce")

forex["INDIA - INDIAN RUPEE/US$"]= pd.to_numeric(forex["INDIA - INDIAN
RUPEE/US$"],errors="coerce")

forex["KOREA - WON/US$"]= pd.to_numeric(forex["KOREA - WON/US$"],error
s="coerce")

forex["MEXICO - MEXICAN PESO/US$"]= pd.to_numeric(forex["MEXICO - MEXI
CAN PESO/US$"],errors="coerce")

forex["SOUTH AFRICA - RAND/US$"]= pd.to_numeric(forex["SOUTH AFRICA -
RAND/US$"],errors="coerce")

forex["SINGAPORE - SINGAPORE DOLLAR/US$"]= pd.to_numeric(forex["SINGAP
ORE - SINGAPORE DOLLAR/US$"],errors="coerce")

forex["DENMARK - DANISH KRONE/US$"]= pd.to_numeric(forex["DENMARK - DA
NISH KRONE/US$"],errors="coerce")

forex["JAPAN - YEN/US$"]= pd.to_numeric(forex["JAPAN - YEN/US$"],error
s="coerce")

forex["MALAYSIA - RINGGIT/US$"]= pd.to_numeric(forex["MALAYSIA - RINGG
IT/US$"],errors="coerce")

forex["NORWAY - NORWEGIAN KRONE/US$"]= pd.to_numeric(forex["NORWAY - N
ORWEGIAN KRONE/US$"],errors="coerce")

forex["SWEDEN - KRONA/US$"]= pd.to_numeric(forex["SWEDEN - KRONA/US$"]
```

```
,errors="coerce")

forex["SRI LANKA - SRI LANKAN RUPEE/US$"]= pd.to_numeric(forex["SRI LA
NKA - SRI LANKAN RUPEE/US$"],errors="coerce")

forex["SWITZERLAND - FRANC/US$"]= pd.to_numeric(forex["SWITZERLAND - F
RANC/US$"],errors="coerce")

forex["TAIWAN - NEW TAIWAN DOLLAR/US$"]= pd.to_numeric(forex["TAIWAN -
NEW TAIWAN DOLLAR/US$"],errors="coerce")

forex["THAILAND - BAHT/US$"]= pd.to_numeric(forex["THAILAND - BAHT/US$
"],errors="coerce")
```

In [11]:
```
#Checking column type
forex.dtypes

#removing na values
forex=forex.dropna()

#checking
forex.head(40)
```

Out[11]:

	Index	Time Serie	AUSTRALIA - AUSTRALIAN DOLLAR/US$	EURO AREA - EURO/US$	NEW ZEALAND - NEW ZELAND DOLLAR/US$	UNITED KINGDOM - UNITED KINGDOM POUND/US$	BRAZIL - REAL/US$	CANAD CANADI DOLLAR/U
0	0	2000-01-03	1.5172	0.9847	1.9033	0.6146	1.8050	1.4
1	1	2000-01-04	1.5239	0.9700	1.9238	0.6109	1.8405	1.4
2	2	2000-01-05	1.5267	0.9676	1.9339	0.6092	1.8560	1.4
3	3	2000-01-06	1.5291	0.9686	1.9436	0.6070	1.8400	1.4
4	4	2000-01-07	1.5272	0.9714	1.9380	0.6104	1.8310	1.4
5	5	2000-01-10	1.5242	0.9754	1.9350	0.6107	1.8190	1.4
6	6	2000-01-11	1.5209	0.9688	1.9365	0.6068	1.8225	1.4
7	7	2000-01-12	1.5202	0.9727	1.9286	0.6073	1.8350	1.4
8	8	2000-01-13	1.4954	0.9737	1.9084	0.6067	1.8140	1.4

9	9	2000-01-14	1.5004	0.9874	1.9186	0.6115	1.8050	1.4
11	11	2000-01-18	1.5060	0.9880	1.9342	0.6105	1.7942	1.4
12	12	2000-01-19	1.5074	0.9886	1.9399	0.6083	1.7930	1.4
13	13	2000-01-20	1.5002	0.9869	1.9486	0.6047	1.7785	1.4
14	14	2000-01-21	1.5103	0.9901	1.9592	0.6059	1.7800	1.4
15	15	2000-01-24	1.5281	0.9981	1.9759	0.6053	1.7680	1.4
16	16	2000-01-25	1.5286	0.9959	1.9732	0.6067	1.7800	1.4
17	17	2000-01-26	1.5373	0.9989	1.9763	0.6099	1.7810	1.4
18	18	2000-01-27	1.5267	1.0111	1.9716	0.6111	1.7800	1.4
19	19	2000-01-28	1.5962	1.0241	2.0534	0.6169	1.7900	1.4
20	20	2000-01-31	1.5669	1.0249	2.0190	0.6180	1.8020	1.4
21	21	2000-02-01	1.5835	1.0276	2.0392	0.6192	1.7950	1.4
22	22	2000-02-02	1.5723	1.0238	2.0416	0.6227	1.7850	1.4
23	23	2000-02-03	1.5657	1.0114	2.0133	0.6240	1.7750	1.4
24	24	2000-02-04	1.5835	1.0246	2.0284	0.6283	1.7730	1.4
25	25	2000-02-07	1.5775	1.0222	2.0259	0.6283	1.7700	1.4
26	26	2000-02-08	1.5741	1.0140	2.0243	0.6209	1.7650	1.4
27	27	2000-02-09	1.5760	1.0087	2.0325	0.6205	1.7700	1.4
28	28	2000-02-10	1.5823	1.0137	2.0263	0.6228	1.7700	1.4
29	29	2000-02-11	1.5918	1.0155	2.0346	0.6280	1.7670	1.4
30	30	2000-02-14	1.5926	1.0222	2.0542	0.6293	1.7690	1.4

31	31	2000-02-15	1.5873	1.0169	2.0534	0.6270	1.7830	1.4
32	32	2000-02-16	1.5870	1.0161	2.0412	0.6234	1.7750	1.4
33	33	2000-02-17	1.5823	1.0139	2.0255	0.6231	1.7770	1.4
34	34	2000-02-18	1.5893	1.0152	2.0371	0.6256	1.7770	1.4
36	36	2000-02-22	1.5982	0.9940	2.0338	0.6186	1.7850	1.4
37	37	2000-02-23	1.6139	0.9983	2.0597	0.6232	1.7900	1.4
38	38	2000-02-24	1.6276	1.0069	2.0547	0.6257	1.7820	1.4
39	39	2000-02-25	1.6194	1.0243	2.0483	0.6286	1.7740	1.4
40	40	2000-02-28	1.6351	1.0342	2.0636	0.6275	1.7790	1.4
41	41	2000-02-29	1.6247	1.0370	2.0555	0.6337	1.7690	1.4

40 rows × 24 columns

In [12]:
```
#creating a subset of the dataset
newforex=forex[["Index","Time Serie","AUSTRALIA - AUSTRALIAN DOLLAR/US$","NEW ZEALAND - NEW ZELAND DOLLAR/US$"]]
```

In [69]:
```
newforex.head()
```

Out[69]:

	Index	Time Serie	AUSTRALIA - AUSTRALIAN DOLLAR/US$	NEW ZEALAND - NEW ZELAND DOLLAR/US$
0	0	2000-01-03	1.5172	1.9033
1	1	2000-01-04	1.5239	1.9238
2	2	2000-01-05	1.5267	1.9339
3	3	2000-01-06	1.5291	1.9436
4	4	2000-01-07	1.5272	1.9380

In [14]:
```
newforex.sort_values(by=["Time Serie"], inplace=True)
```

```
/opt/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:1:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pand
as-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
py
  """Entry point for launching an IPython kernel.
```

In [15]:
```
newforex.head()
```

Out[15]:

	Index	Time Serie	AUSTRALIA - AUSTRALIAN DOLLAR/US$	NEW ZEALAND - NEW ZELAND DOLLAR/US$
0	0	2000-01-03	1.5172	1.9033
1	1	2000-01-04	1.5239	1.9238
2	2	2000-01-05	1.5267	1.9339
3	3	2000-01-06	1.5291	1.9436
4	4	2000-01-07	1.5272	1.9380

In [70]:
```
pip install openpyxl
```

```
Requirement already satisfied: openpyxl in /opt/anaconda3/lib/python
3.7/site-packages (3.0.3)
Requirement already satisfied: et-xmlfile in /opt/anaconda3/lib/pyth
on3.7/site-packages (from openpyxl) (1.0.1)
Requirement already satisfied: jdcal in /opt/anaconda3/lib/python3.7
/site-packages (from openpyxl) (1.4.1)
Note: you may need to restart the kernel to use updated packages.
```

In [71]:
```
pip install xlwt
```

```
Requirement already satisfied: xlwt in /opt/anaconda3/lib/python3.7/
site-packages (1.3.0)
Note: you may need to restart the kernel to use updated packages.
```

In [207]:
```
#exporting newforex to excel
newforex.to_csv('~/Desktop/project/newforex.csv', index = True)
```

In [19]:
```
#Australia
aus=forex[["Time Serie","AUSTRALIA - AUSTRALIAN DOLLAR/US$"]]
aus1=forex[["AUSTRALIA - AUSTRALIAN DOLLAR/US$"]]

#Euro
eur=forex[["Time Serie","EURO AREA - EURO/US$"]]
eur1=forex[["EURO AREA - EURO/US$"]]

#Newzealand
nzd=forex[["Time Serie","NEW ZEALAND - NEW ZELAND DOLLAR/US$"]]
nzd1=forex[["NEW ZEALAND - NEW ZELAND DOLLAR/US$"]]

#United Kingdom
uk=forex[["Time Serie","UNITED KINGDOM - UNITED KINGDOM POUND/US$"]]
uk1=forex[["NEW ZEALAND - NEW ZELAND DOLLAR/US$"]]

#Brazil
brz=forex[["Time Serie","BRAZIL - REAL/US$"]]
brz1=forex[["BRAZIL - REAL/US$"]]

#Canada
can=forex[["Time Serie","CANADA - CANADIAN DOLLAR/US$"]]
can1=forex[["CANADA - CANADIAN DOLLAR/US$"]]

#China
chn=forex[["Time Serie","CHINA - YUAN/US$"]]
chn1=forex[["CHINA - YUAN/US$"]]

#Hongkong
hk=forex[["Time Serie","HONG KONG - HONG KONG DOLLAR/US$"]]
hk1=forex[["HONG KONG - HONG KONG DOLLAR/US$"]]

#India
ind=forex[["Time Serie","INDIA - INDIAN RUPEE/US$"]]
ind1=forex[["INDIA - INDIAN RUPEE/US$"]]

#Korea
kor=forex[["Time Serie","KOREA - WON/US$"]]
kor1=forex[["KOREA - WON/US$"]]

#Mexico
mex=forex[["Time Serie","MEXICO - MEXICAN PESO/US$"]]
mex1=forex[["MEXICO - MEXICAN PESO/US$"]]

#South Africa
sfa=forex[["Time Serie","SOUTH AFRICA - RAND/US$"]]
sfa1=[["SOUTH AFRICA - RAND/US$"]]

#Singapore
sgp=forex[["Time Serie","SINGAPORE - SINGAPORE DOLLAR/US$"]]
```

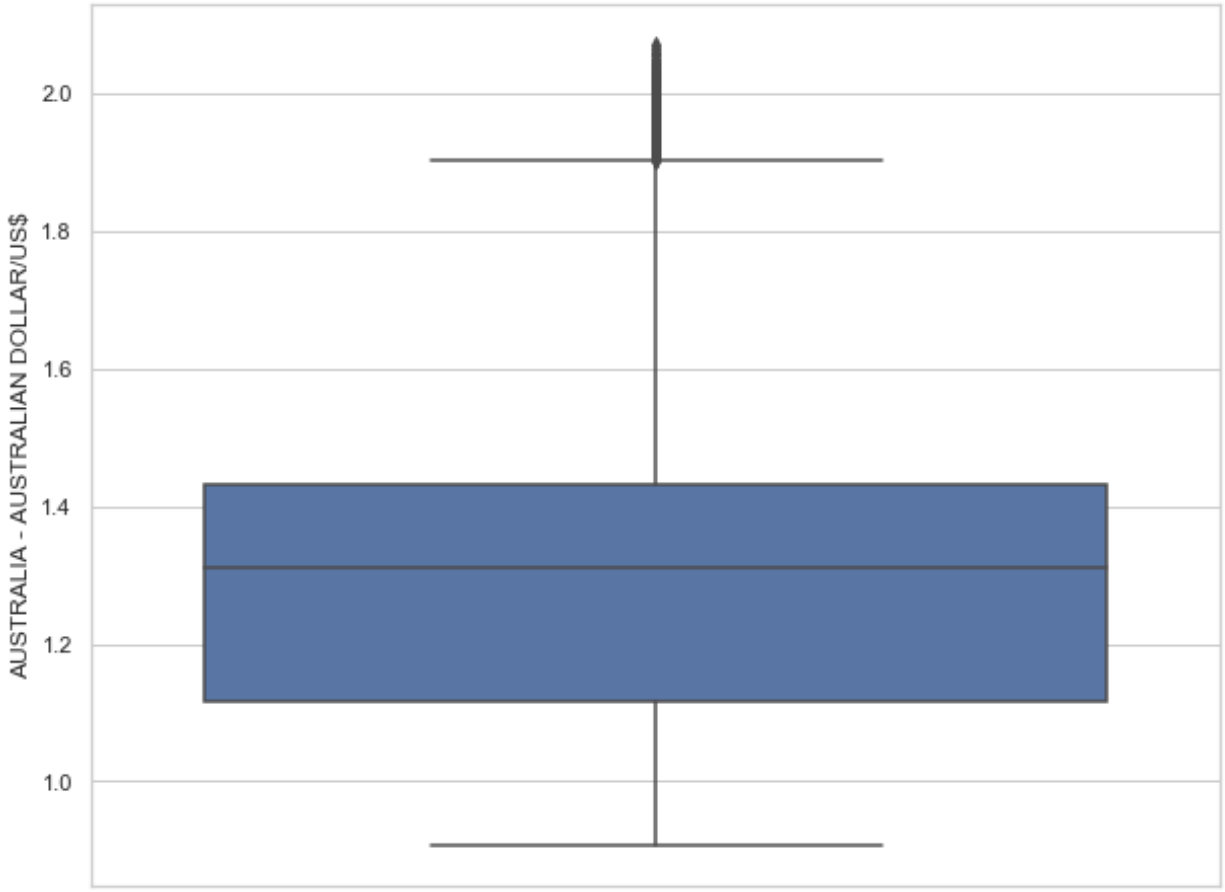
```
sgp=forex[["SINGAPORE - SINGAPORE DOLLAR/US$"]]

#Denmark
dnk=forex[["Time Serie","DENMARK - DANISH KRONE/US$"]]
dnk1=forex[["DENMARK - DANISH KRONE/US$"]]

#Japan
jpn=forex[["Time Serie","JAPAN - YEN/US$"]]
jpn1=forex[["JAPAN - YEN/US$"]]

#Malaysia
mla=forex[["Time Serie","MALAYSIA - RINGGIT/US$"]]
mla1=[["MALAYSIA - RINGGIT/US$"]]

#Norway
nor=forex[["Time Serie","NORWAY - NORWEGIAN KRONE/US$"]]
nor1=forex[["NORWAY - NORWEGIAN KRONE/US$"]]

#Sweden
swd=forex[["Time Serie","SWEDEN - KRONA/US$"]]
swd1=forex["SWEDEN - KRONA/US$"]

#Srilanka
srk=forex[["Time Serie","SRI LANKA - SRI LANKAN RUPEE/US$"]]
srk1=forex[["SRI LANKA - SRI LANKAN RUPEE/US$"]]

#Switzerland
swz=forex[["Time Serie","SWITZERLAND - FRANC/US$"]]
swz1=forex[["SWITZERLAND - FRANC/US$"]]

#Taiwan
tw=forex[["Time Serie","TAIWAN - NEW TAIWAN DOLLAR/US$"]]
tw1=[["TAIWAN - NEW TAIWAN DOLLAR/US$"]]

#Thailand
thai=forex[["Time Serie","THAILAND - BAHT/US$"]]
thai1=forex[["THAILAND - BAHT/US$"]]
```

In [45]:
```
aus.describe()
```

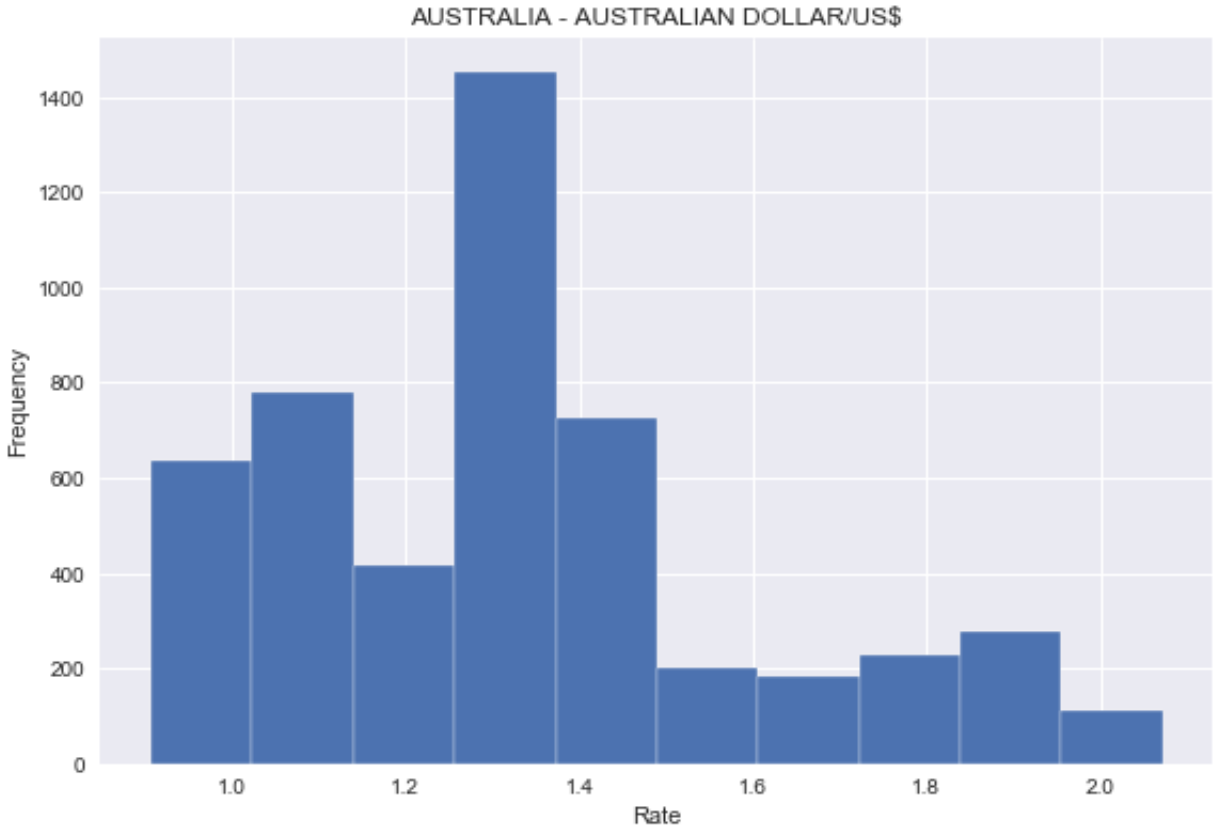
Out[45]:

	AUSTRALIA - AUSTRALIAN DOLLAR/US$
count	5015.000000
mean	1.332160
std	0.269974
min	0.906900
25%	1.115200
50%	1.311300
75%	1.430400
max	2.071300

In [85]:
```
import matplotlib.pyplot as plt
import seaborn as sns

%matplotlib inline

sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='AUSTRALIA - AUSTRALIAN DOLLAR/US$', data=aus, orie
nt="v")
```



In [182]:
```
aus.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

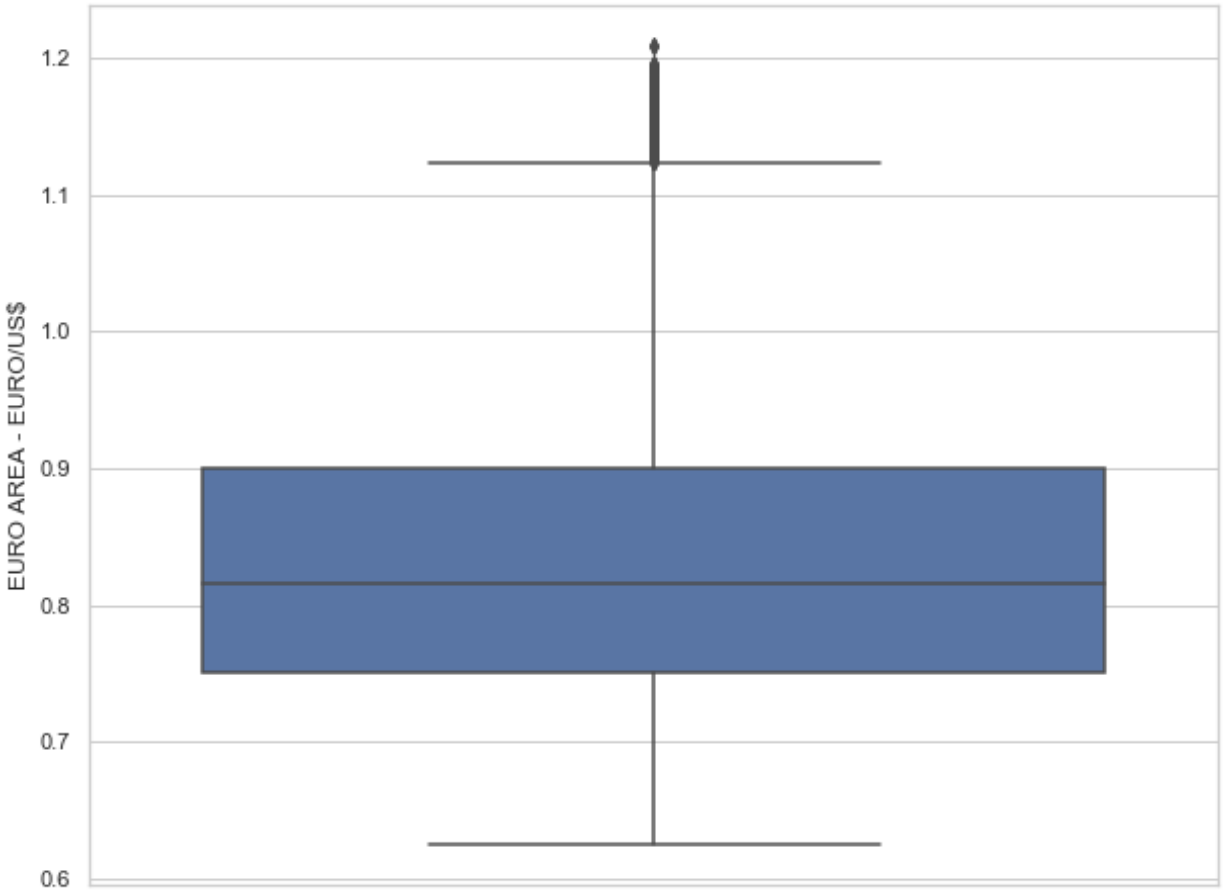


In [68]:
```
eur.describe()
```

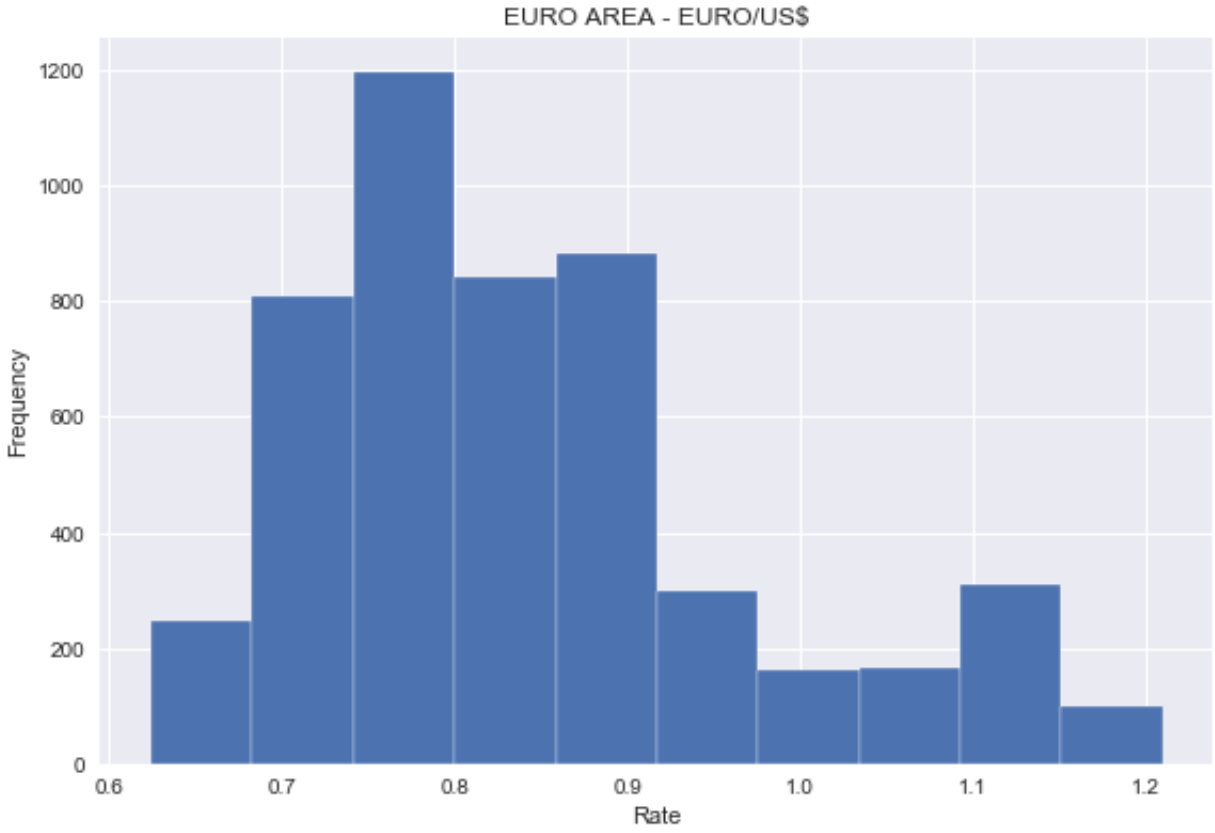
Out[68]:

	EURO AREA - EURO/US$
count	5015.000000
mean	0.844014
std	0.126826
min	0.624600
25%	0.751000
50%	0.815600
75%	0.900150
max	1.209200

In [86]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='EURO AREA - EURO/US$', data=eur, orient="v")
```



In [184]:
```
eur.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

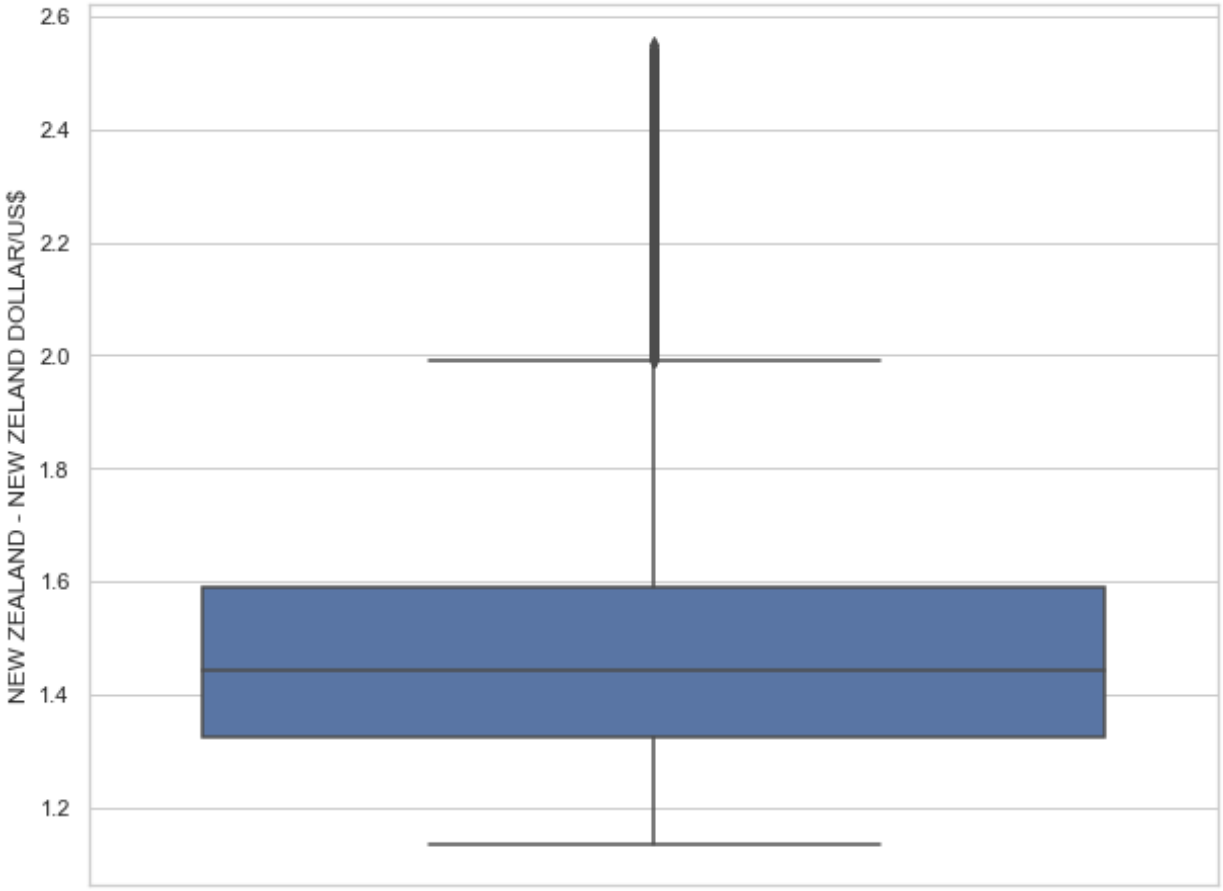


In [48]:
```
nzd.describe()
```

Out[48]:

	NEW ZEALAND - NEW ZELAND DOLLAR/US$
count	5015.000000
mean	1.543820
std	0.337414
min	1.134600
25%	1.323800
50%	1.442600
75%	1.591200
max	2.551000

In [87]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='NEW ZEALAND - NEW ZELAND DOLLAR/US$', data=nzd, or
ient="v")
```



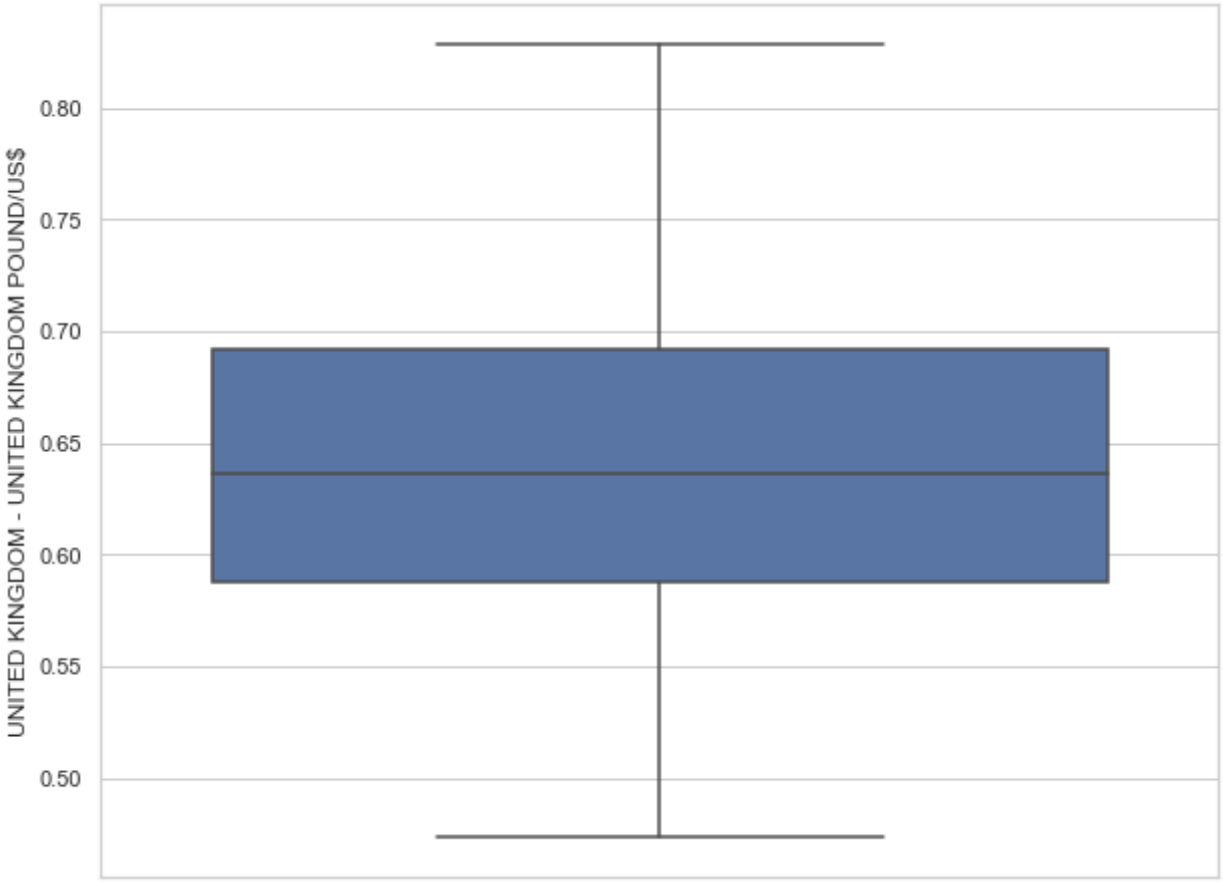
In [ ]:
```
nzd.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

In [49]:
```
uk.describe()
```

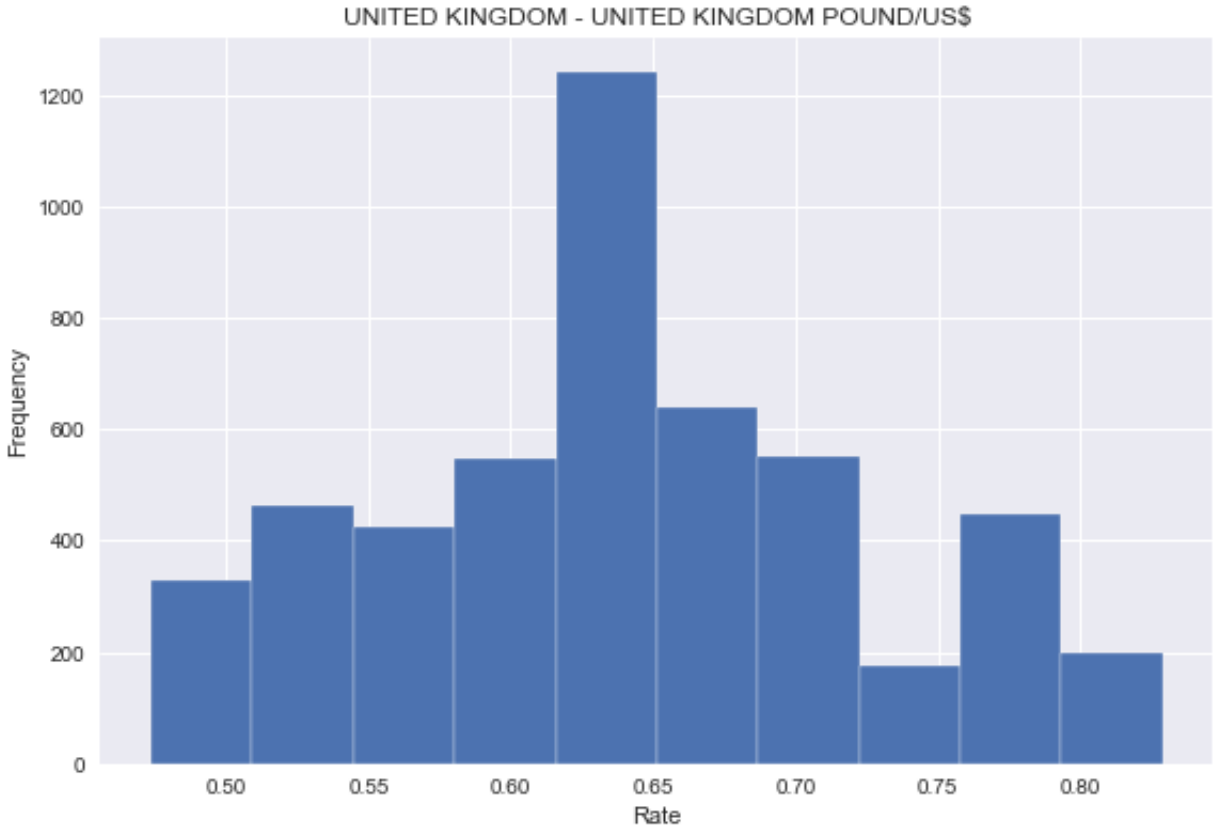
Out[49]:

	UNITED KINGDOM - UNITED KINGDOM POUND/US$
count	5015.000000
mean	0.640466
std	0.082562
min	0.473800
25%	0.587500
50%	0.636500
75%	0.692400
max	0.828700

In [89]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='UNITED KINGDOM - UNITED KINGDOM POUND/US$', data=u
k, orient="v")
```



In [185]:
```
uk.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

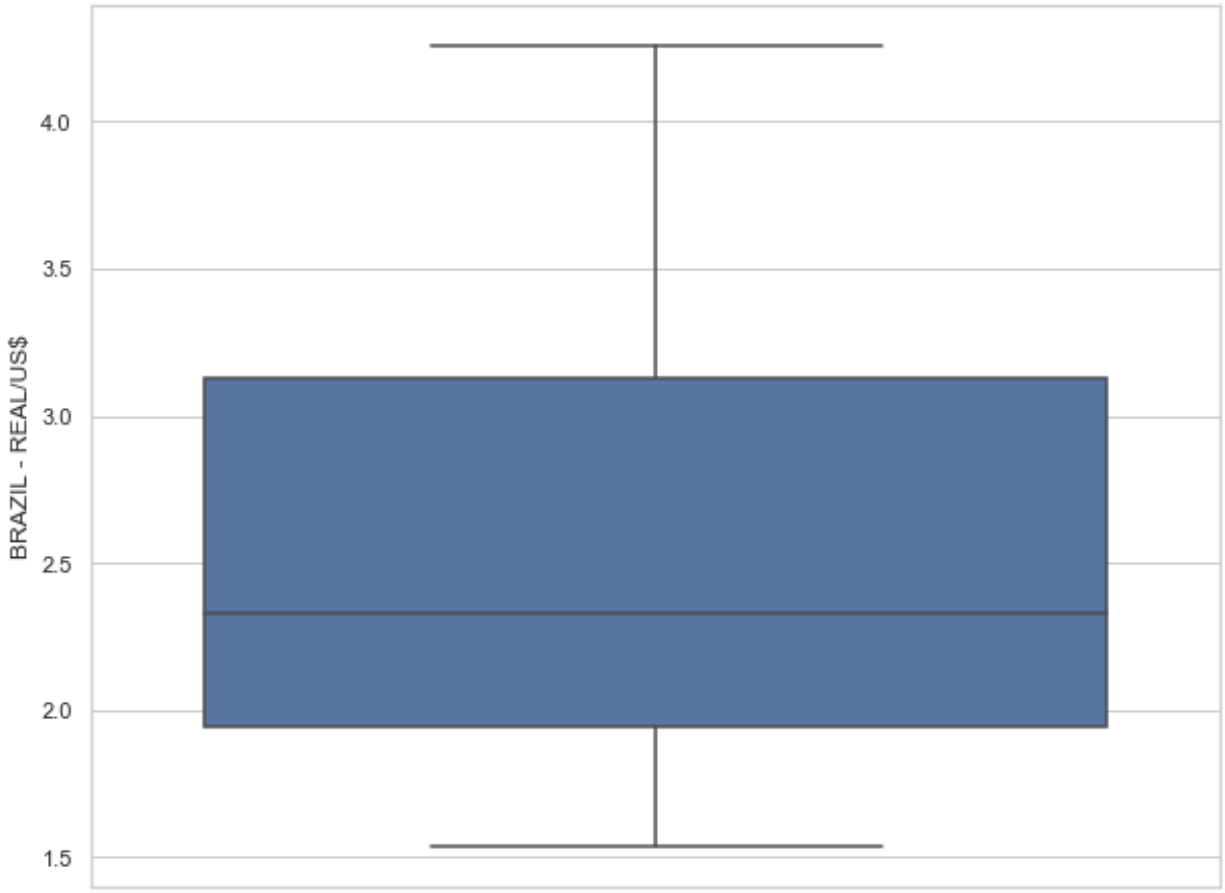


In [50]:
```
brz.describe()
```

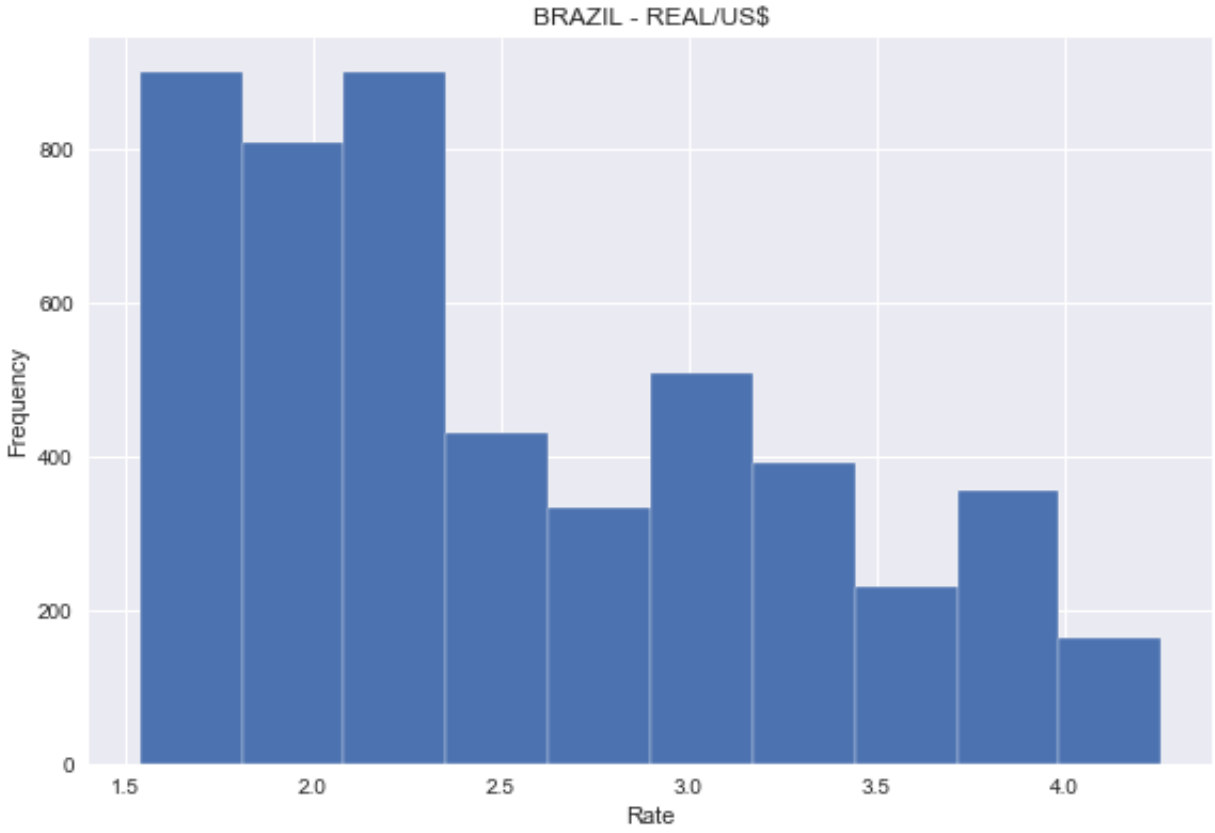
Out[50]:

	BRAZIL - REAL/US$
count	5015.000000
mean	2.548483
std	0.724234
min	1.537500
25%	1.945650
50%	2.329100
75%	3.130000
max	4.259400

In [100]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='BRAZIL - REAL/US$', data=brz, orient="v")
```



In [186]:
```
brz.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

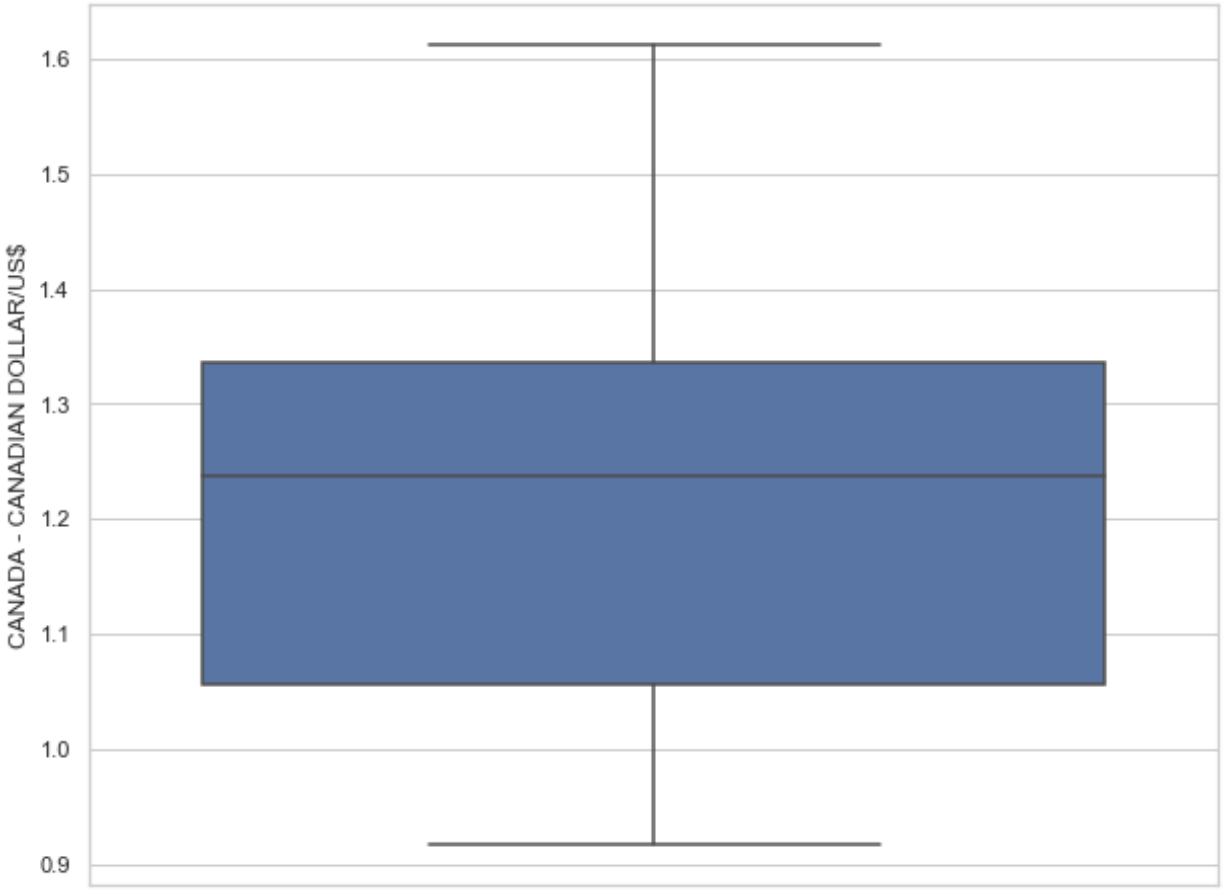


In [51]:
```
can.describe()
```

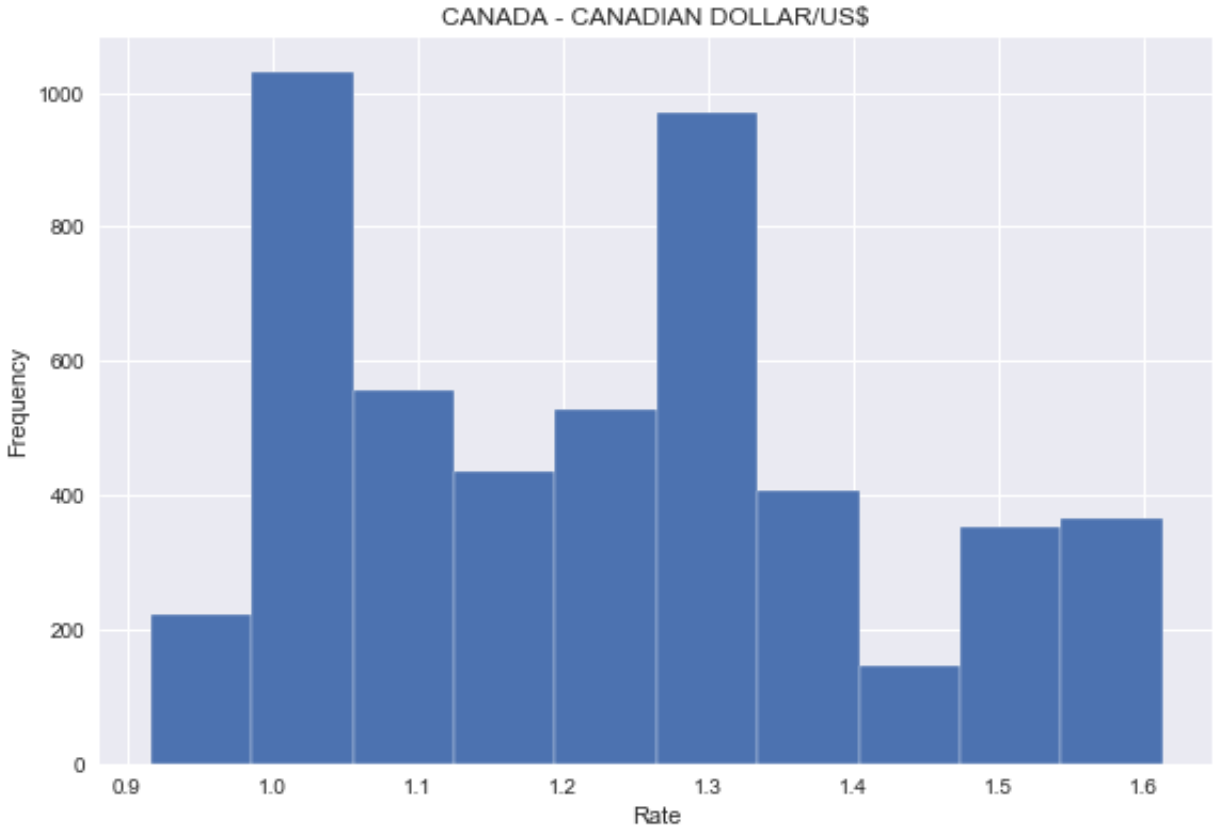
Out[51]:

	CANADA - CANADIAN DOLLAR/US$
count	5015.000000
mean	1.230503
std	0.182136
min	0.916800
25%	1.055850
50%	1.237100
75%	1.335700
max	1.612800

In [101]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='CANADA - CANADIAN DOLLAR/US$', data=can, orient="v
")
```



In [187]:
```
can.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

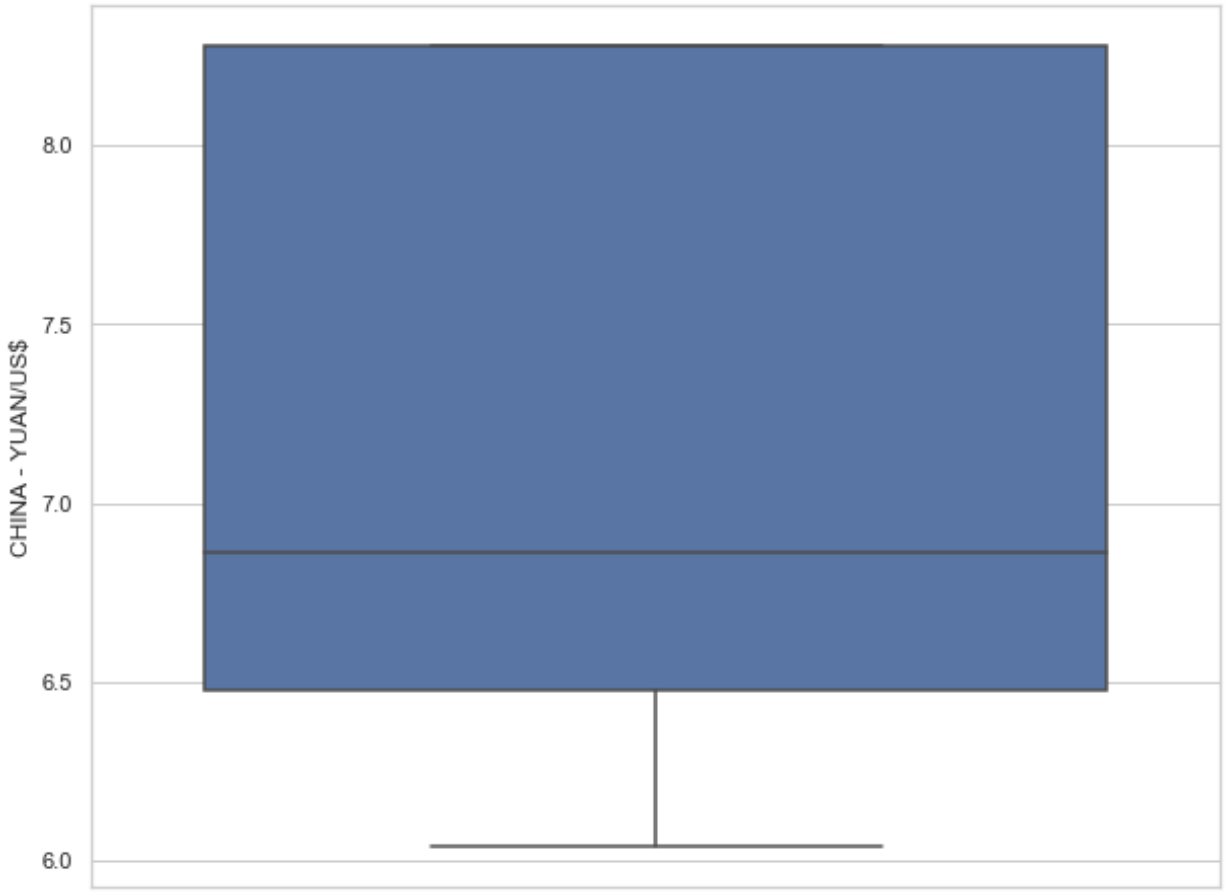


In [52]:
```
chn.describe()
```

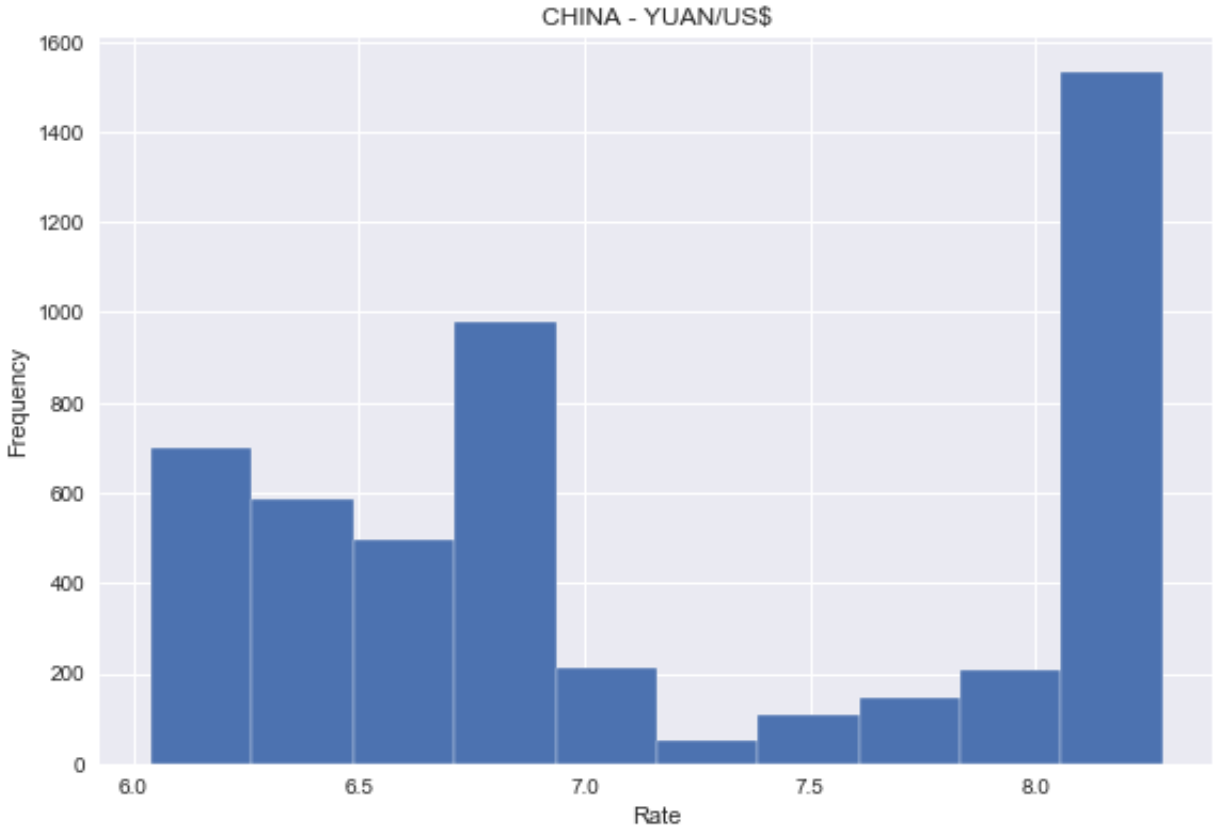
Out[52]:

	CHINA - YUAN/US$
count	5015.000000
mean	7.200544
std	0.820413
min	6.040200
25%	6.475550
50%	6.860000
75%	8.276500
max	8.280000

In [109]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='CHINA - YUAN/US$', data=chn, orient="v")
```



In [188]:
```
chn.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

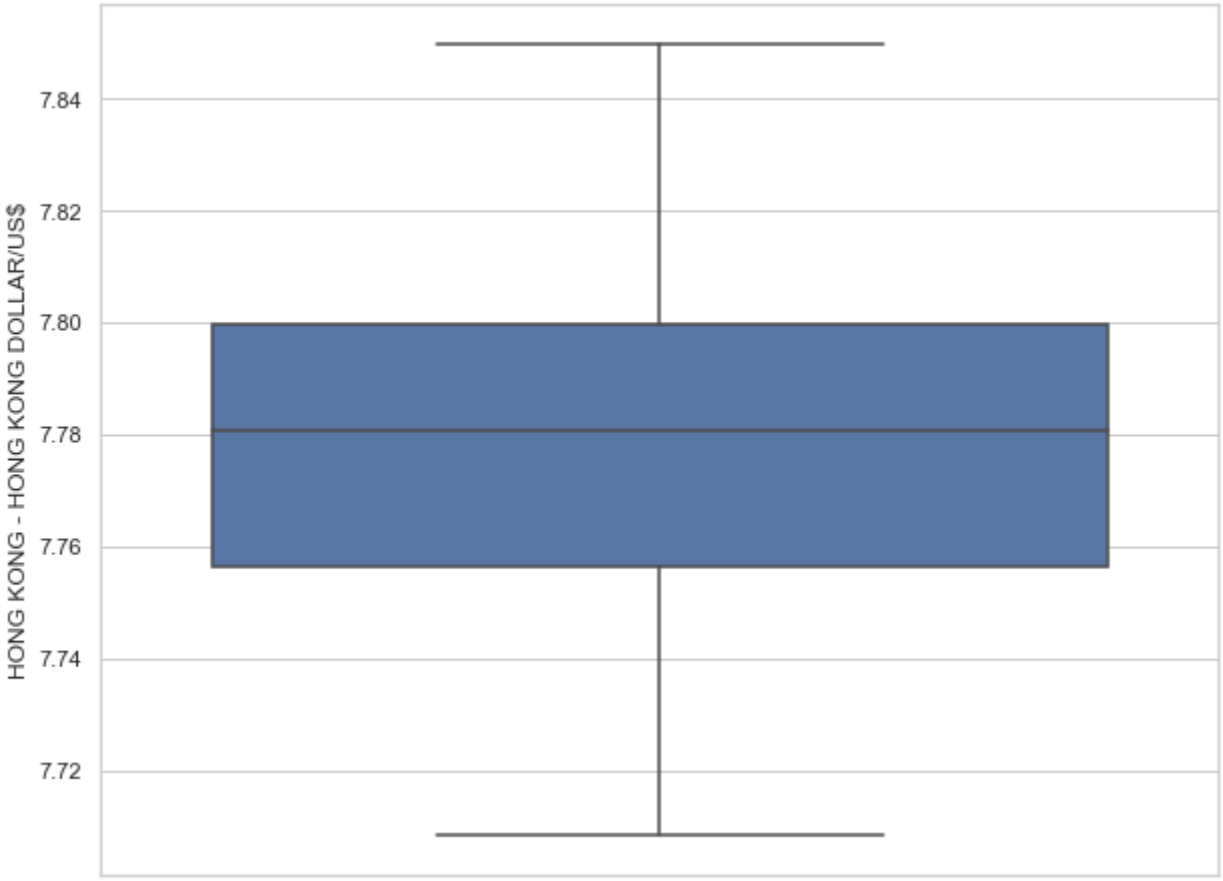


In [53]:
```
hk.describe()
```

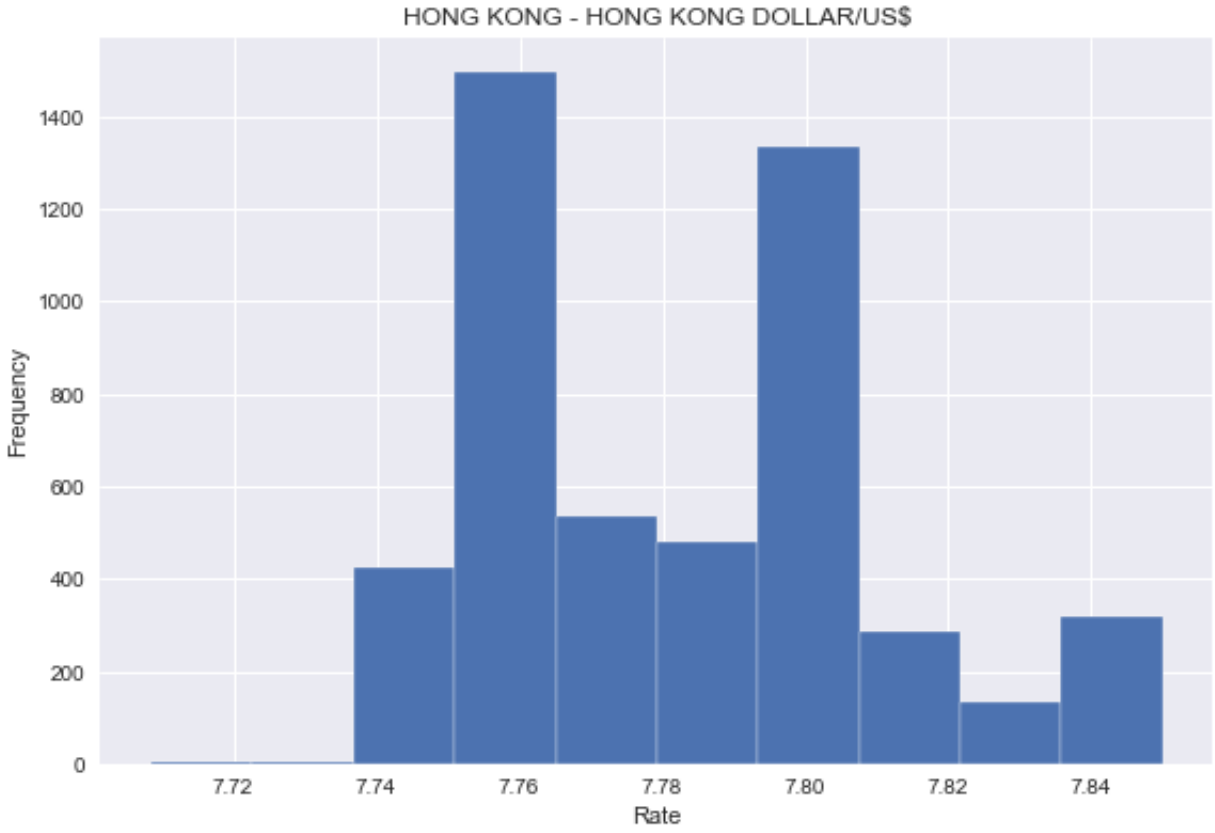
Out[53]:

	HONG KONG - HONG KONG DOLLAR/US$
count	5015.000000
mean	7.782643
std	0.027551
min	7.708500
25%	7.756400
50%	7.780600
75%	7.799800
max	7.849900

In [112]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='HONG KONG - HONG KONG DOLLAR/US$', data=hk, orient
="v")
```



In [190]:
```
hk.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

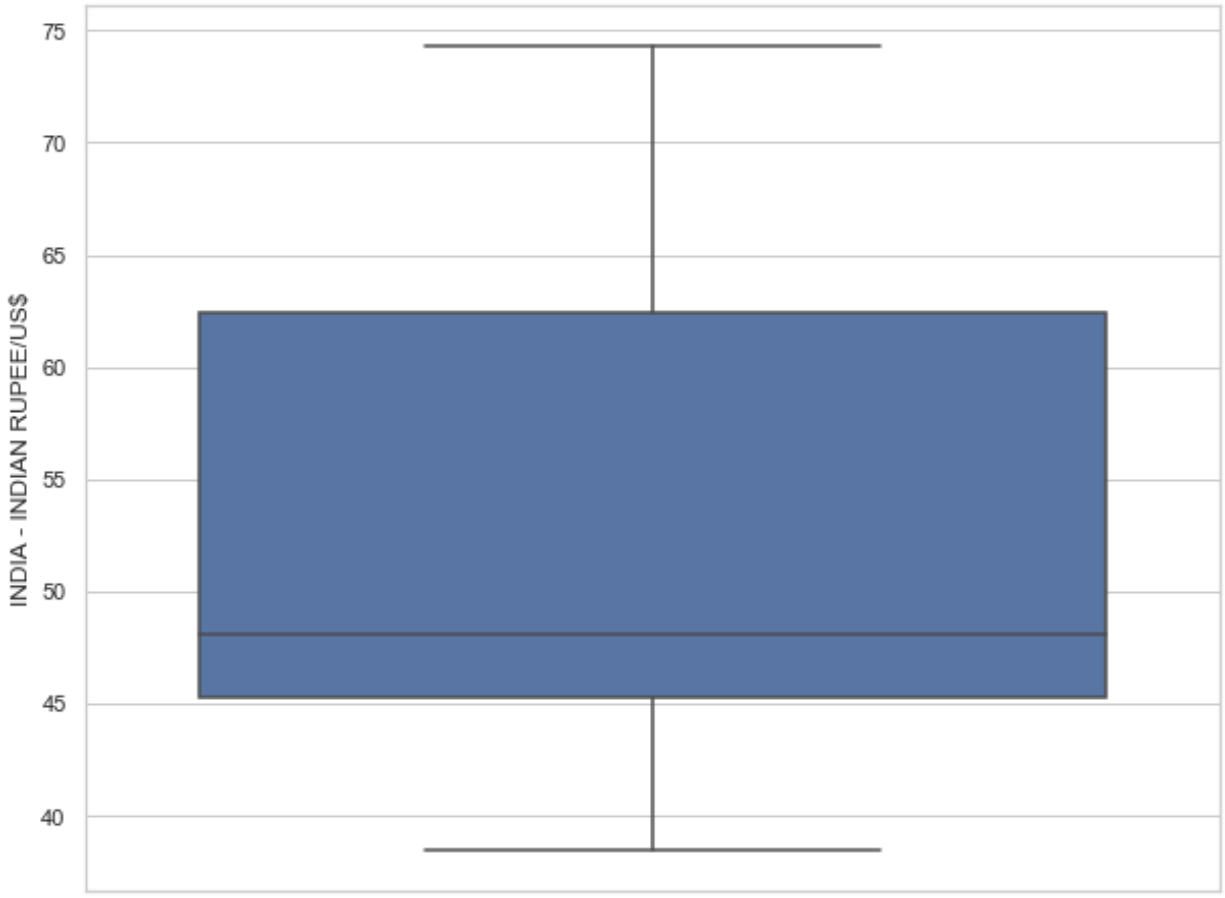


In [54]:
```
ind.describe()
```

Out[54]:

	INDIA - INDIAN RUPEE/US$
count	5015.000000
mean	52.726249
std	9.678708
min	38.480000
25%	45.250000
50%	48.100000
75%	62.440000
max	74.330000

In [113]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='INDIA - INDIAN RUPEE/US$', data=ind, orient="v")
```

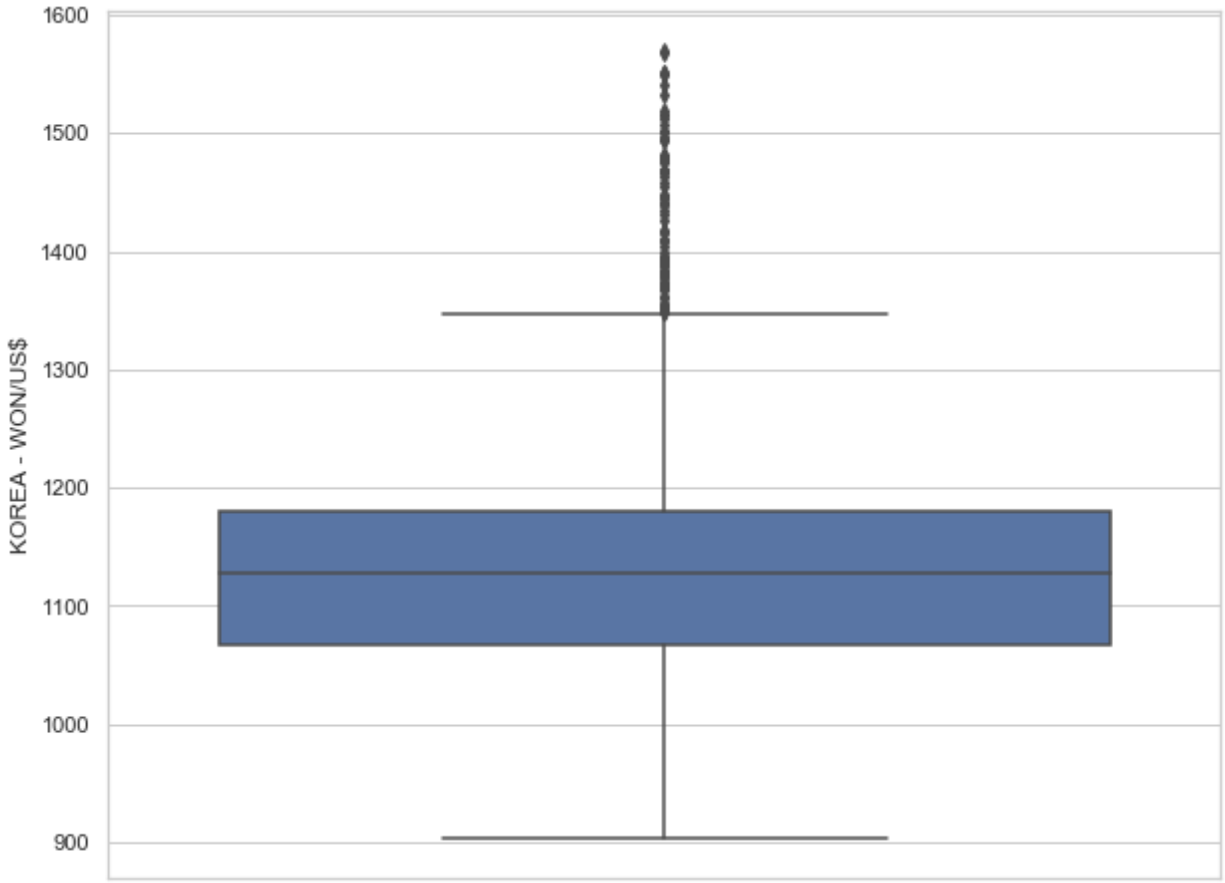


In [55]:
```
kor.describe()
```

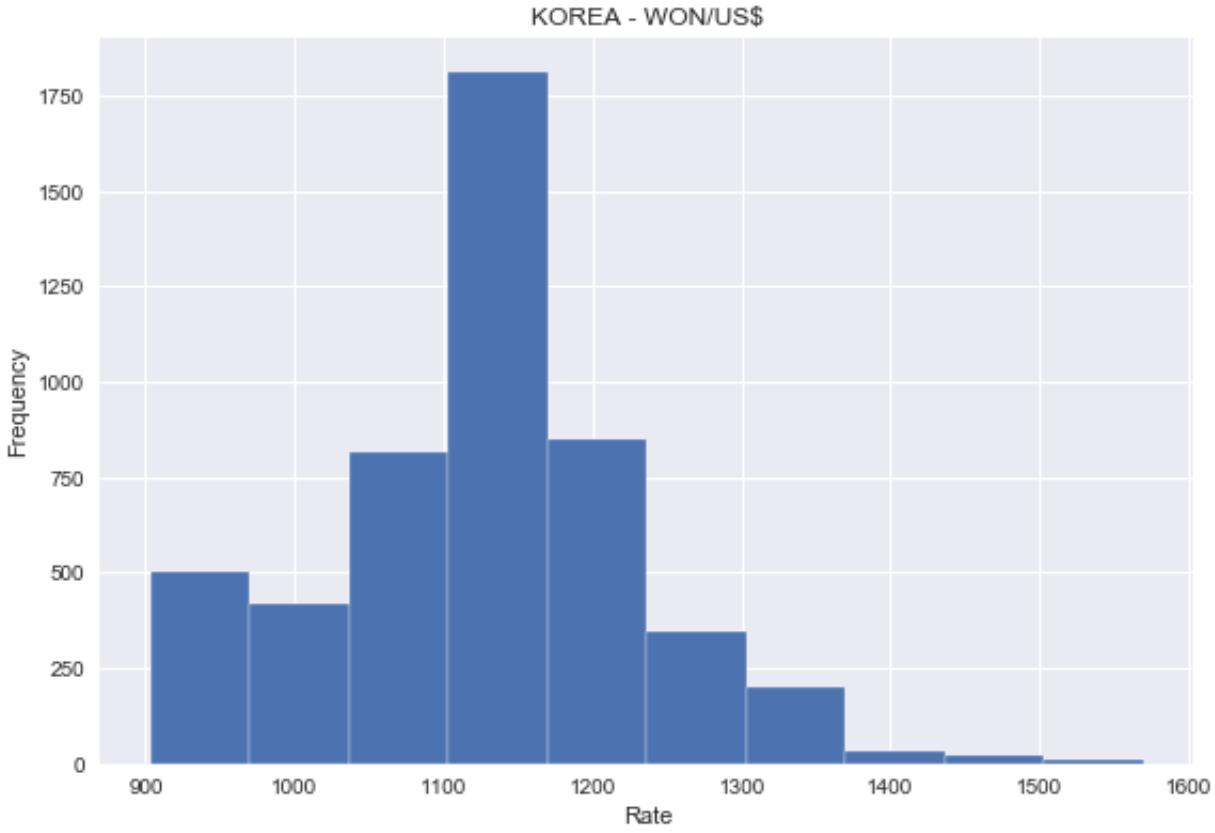
Out[55]:

	KOREA - WON/US$
count	5015.000000
mean	1125.552552
std	103.406953
min	903.200000
25%	1067.570000
50%	1127.790000
75%	1180.000000
max	1570.100000

In [114]:
```
sns.set(style="whitegrid")
plt.figure(figsize=(10,8))
ax = sns.boxplot(x='KOREA - WON/US$', data=kor, orient="v")
```



In [192]:
```
kor.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

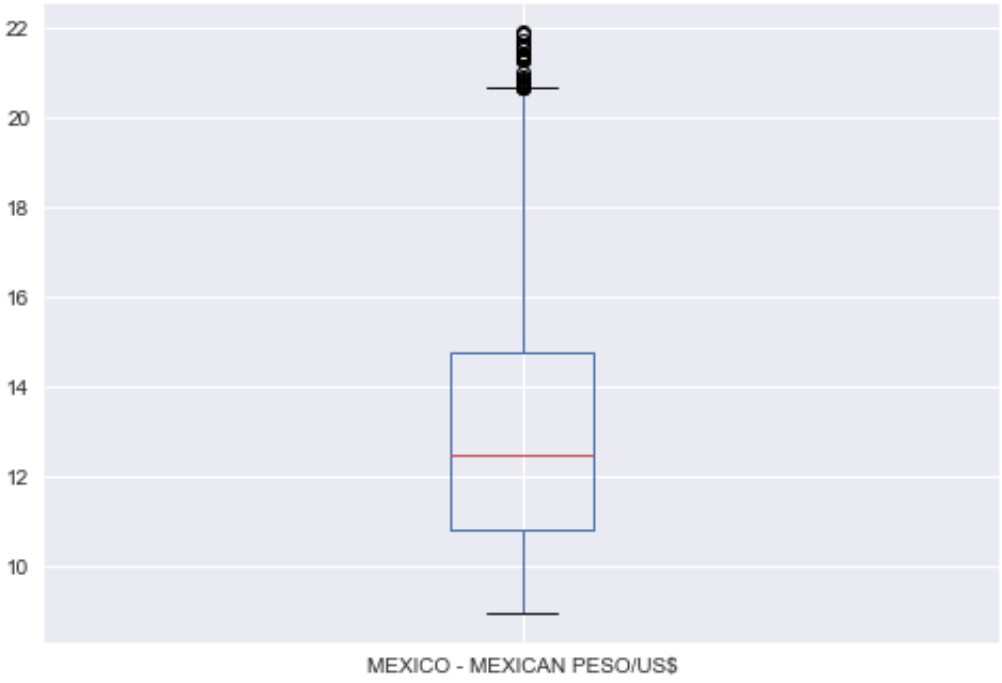


In [56]:
```
mex.describe()
```

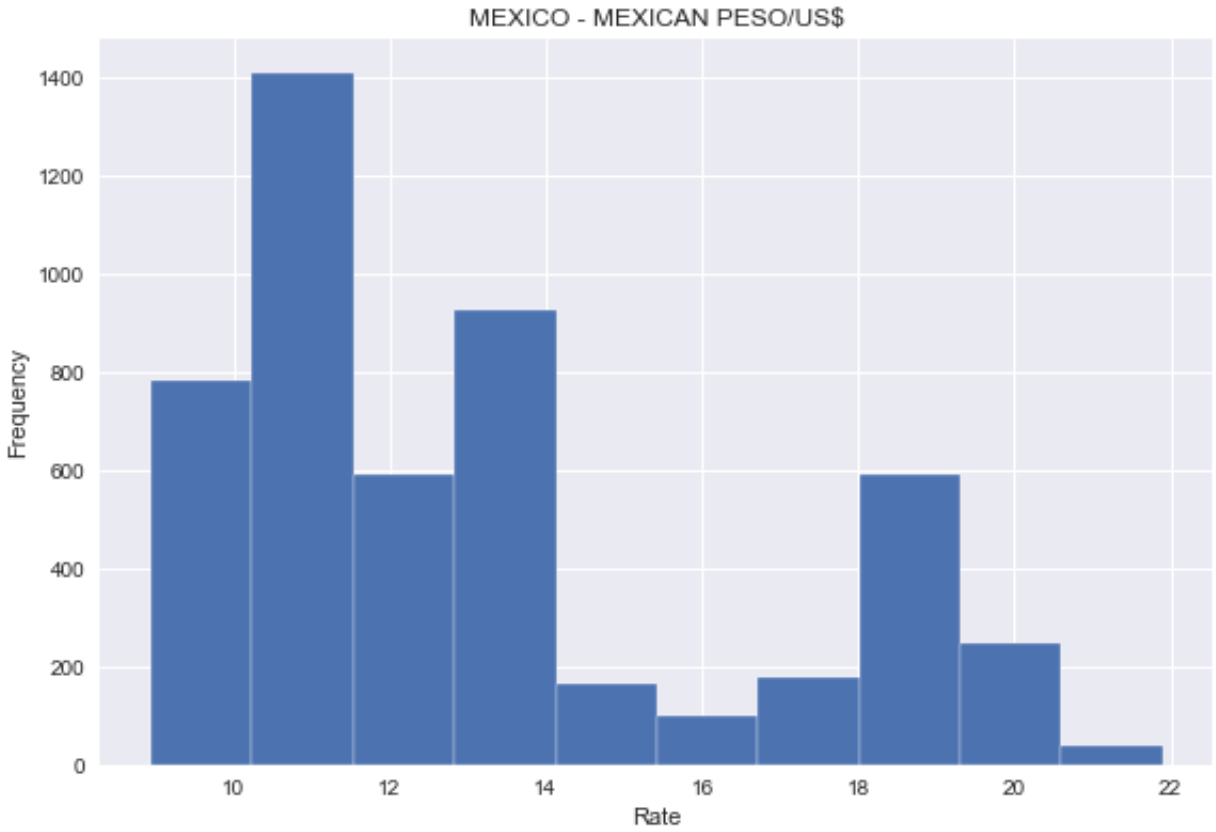
Out[56]:

	MEXICO - MEXICAN PESO/US$
count	5015.000000
mean	13.195141
std	3.318176
min	8.946000
25%	10.801750
50%	12.462500
75%	14.745000
max	21.891000

In [193]:
```
mex.boxplot()
plt.show()
```



In [194]:
```
mex.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

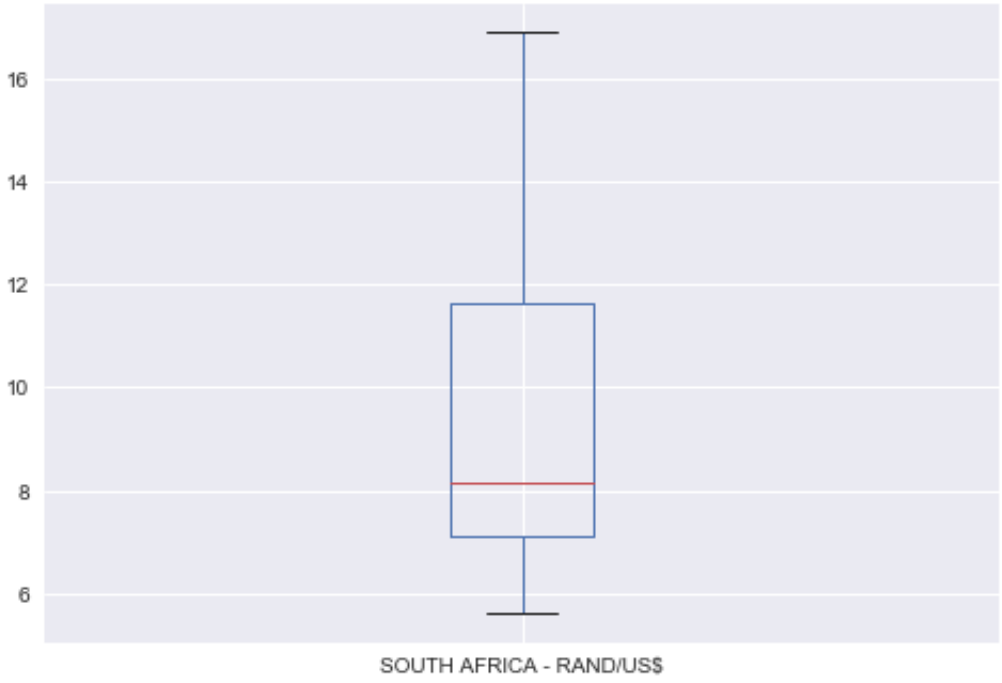


In [57]:
```
sfa.describe()
```

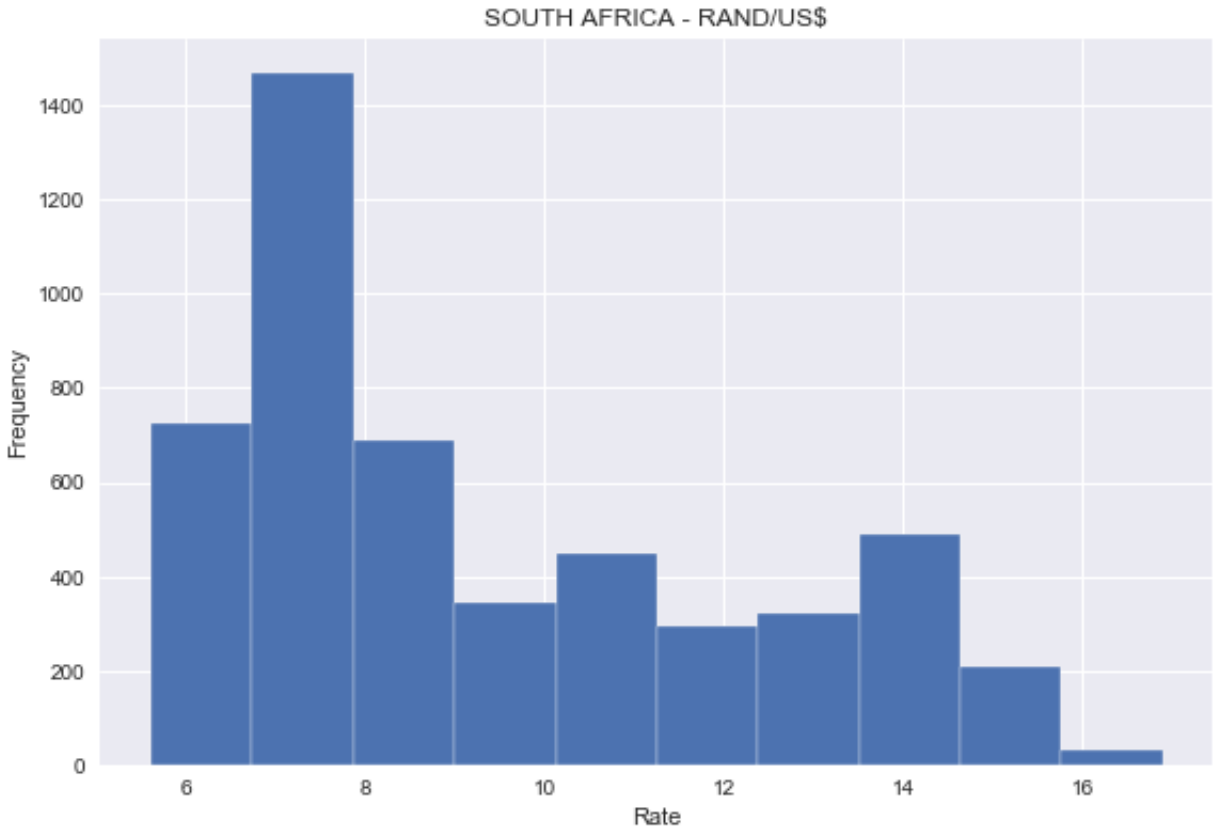
Out[57]:

	SOUTH AFRICA - RAND/US$
count	5015.000000
mean	9.422128
std	2.831540
min	5.615000
25%	7.113750
50%	8.167100
75%	11.626250
max	16.884500

In [150]:
```
sfa.boxplot()
plt.show()
```



In [195]:
```
sfa.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

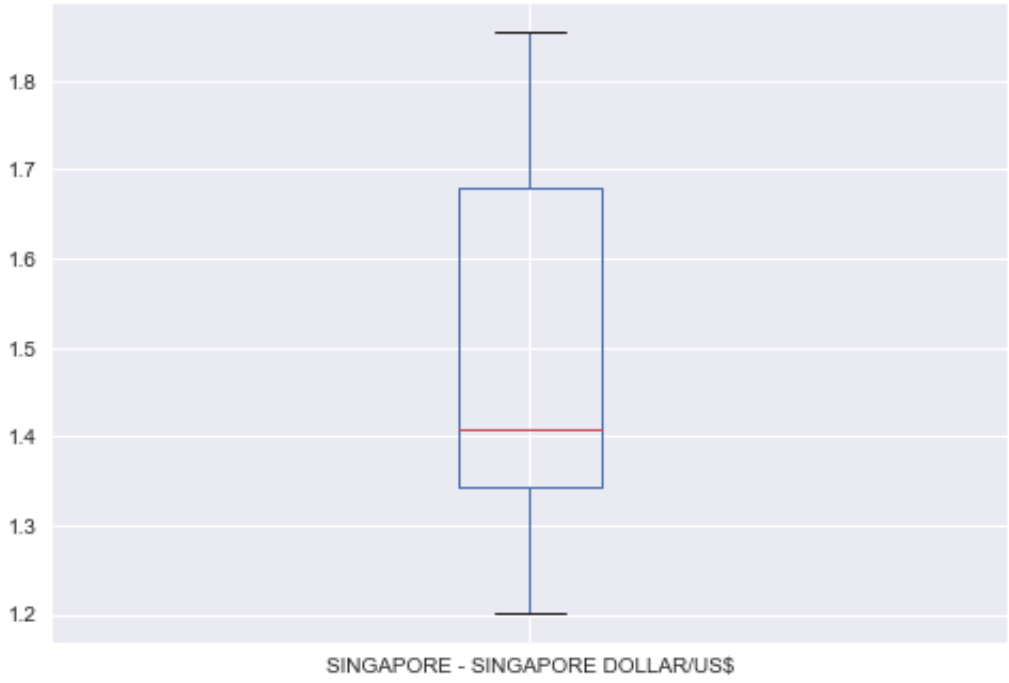


In [34]:
```
sgp.describe()
```

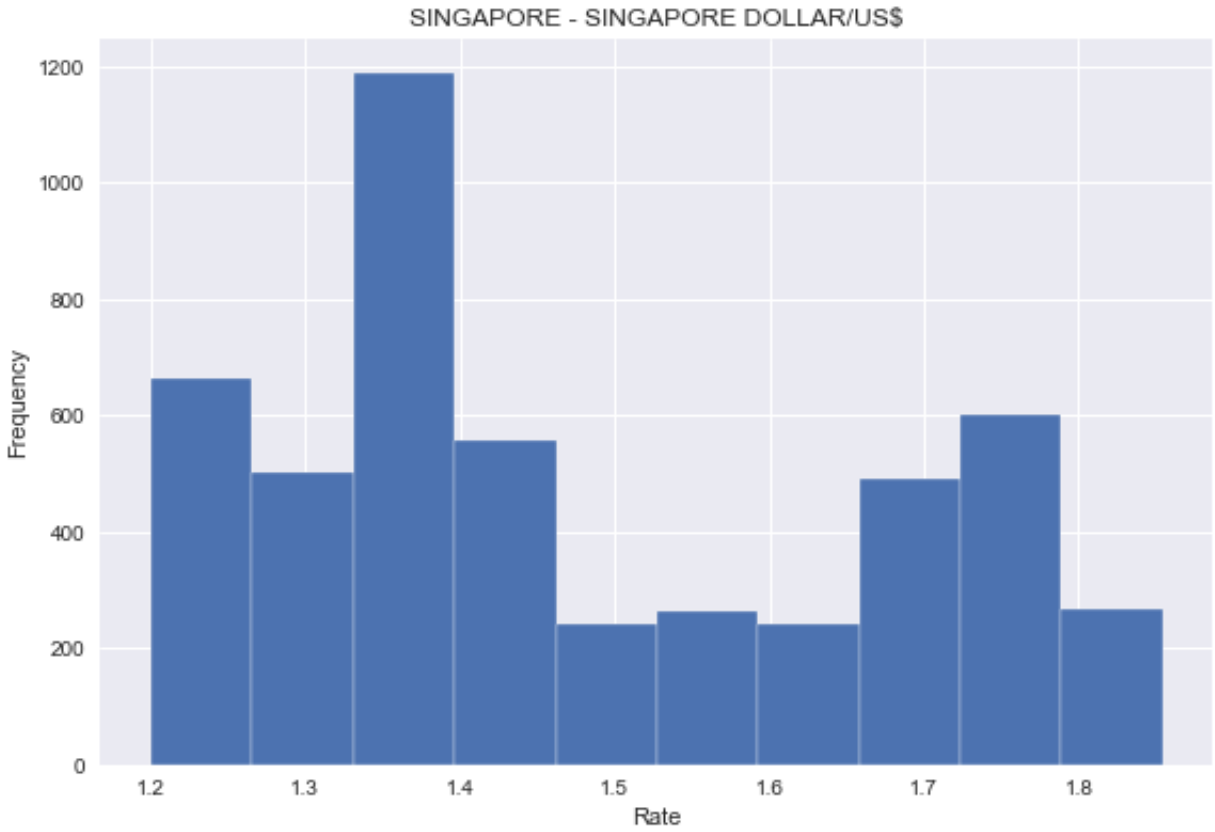
Out[34]:

	SINGAPORE - SINGAPORE DOLLAR/US$
count	5015.000000
mean	1.480412
std	0.189003
min	1.200700
25%	1.342900
50%	1.408400
75%	1.679350
max	1.854000

In [151]:
```
sgp.boxplot()
plt.show()
```



In [196]:
```
sgp.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

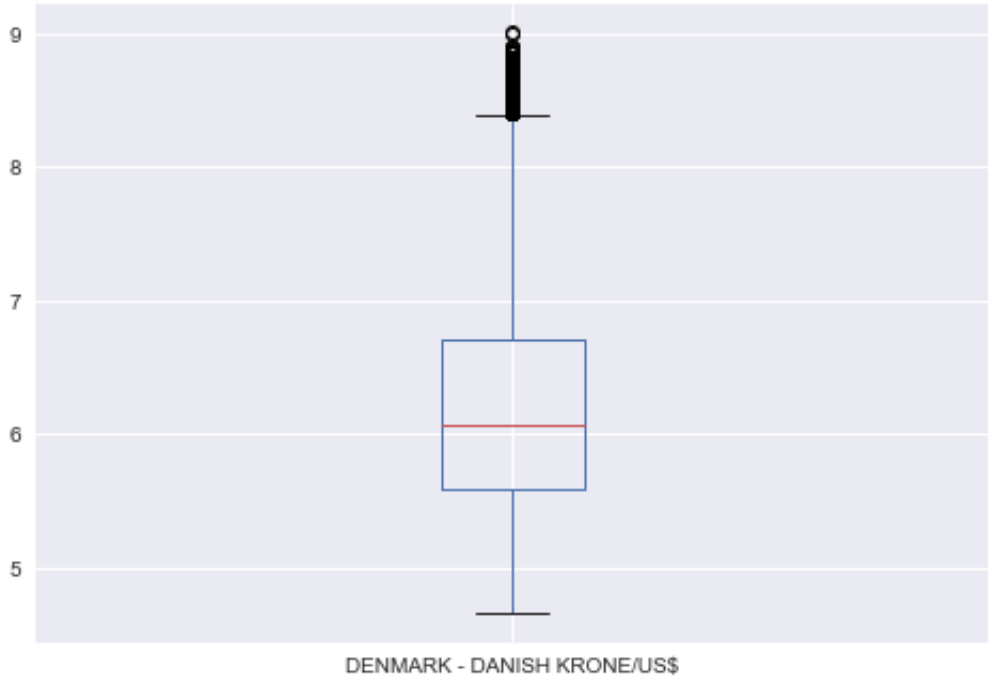


In [58]:
```
dnk.describe()
```

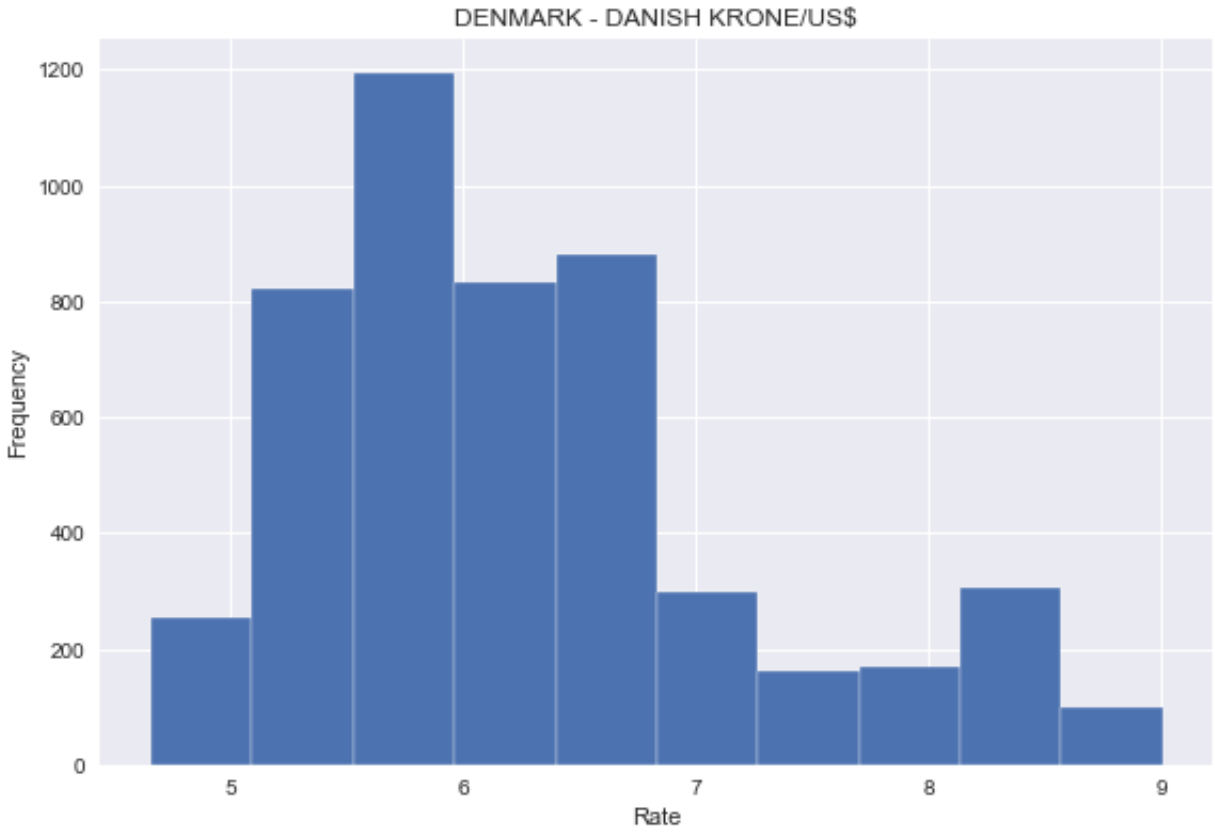
Out[58]:

	DENMARK - DANISH KRONE/US$
count	5015.000000
mean	6.286814
std	0.943430
min	4.660500
25%	5.593550
50%	6.072500
75%	6.714850
max	9.005000

In [153]:
```
dnk.boxplot()
plt.show()
```



In [197]:
```
dnk.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

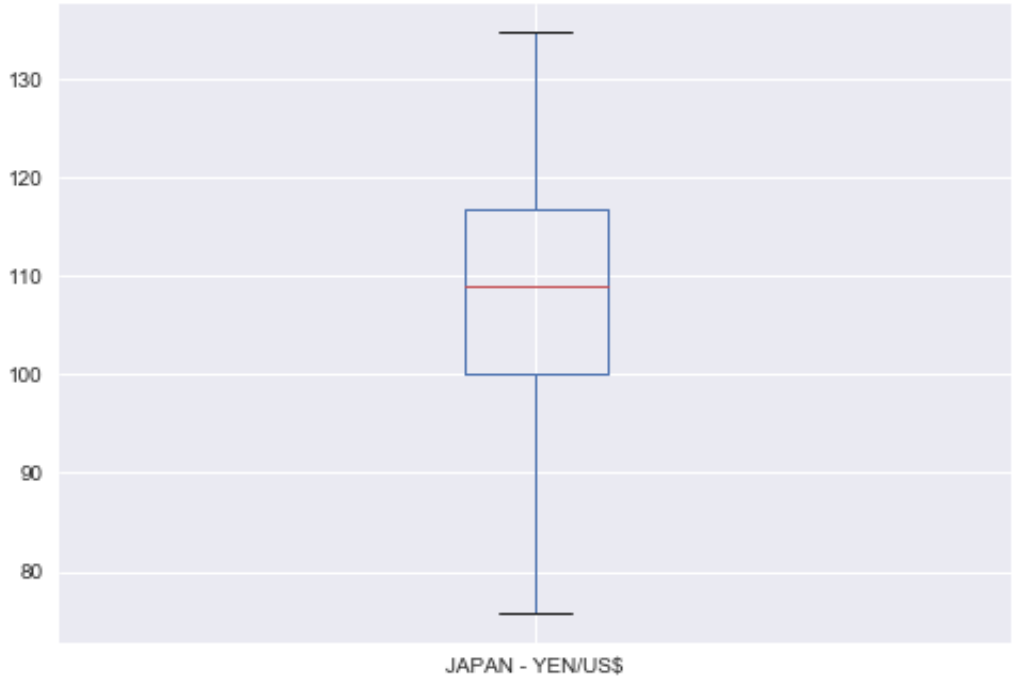


In [59]:
```
jpn.describe()
```

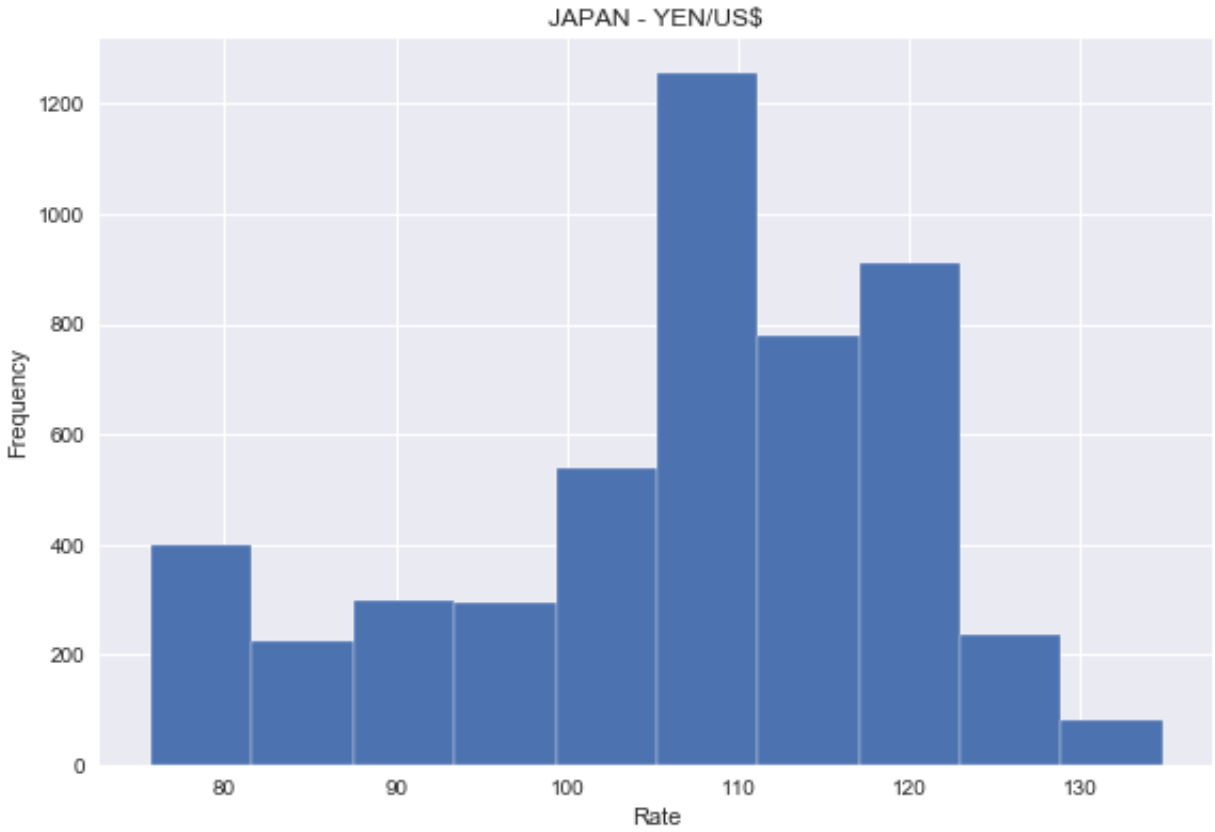
Out[59]:

	JAPAN - YEN/US$
count	5015.000000
mean	106.589230
std	13.211723
min	75.720000
25%	100.080000
50%	109.020000
75%	116.815000
max	134.770000

In [156]:
```
jpn.boxplot()
plt.show()
```



In [198]:
```
jpn.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

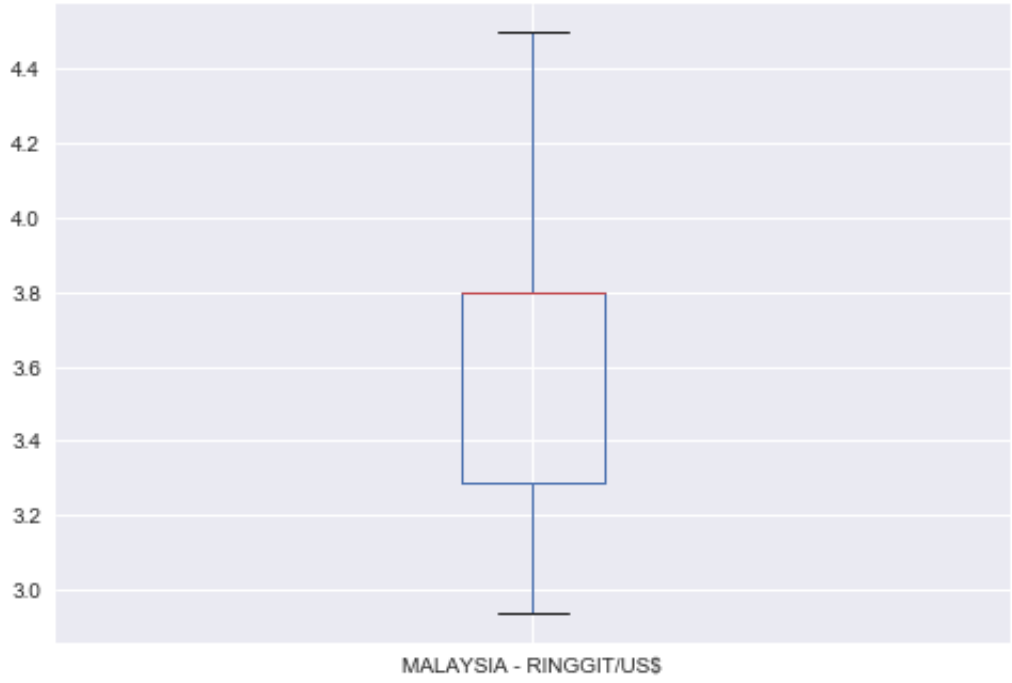


In [60]:
```
mla.describe()
```

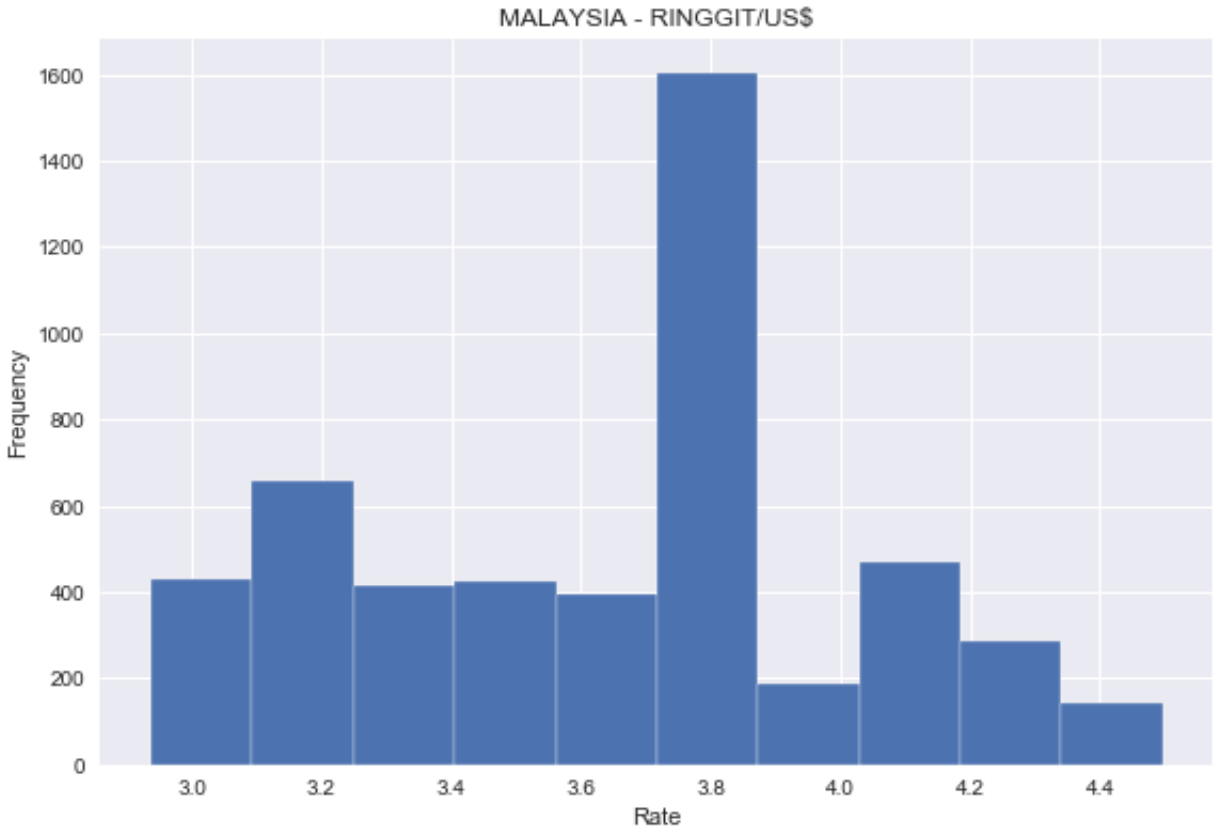
Out[60]:

	MALAYSIA - RINGGIT/US$
count	5015.000000
mean	3.651129
std	0.378635
min	2.937000
25%	3.290500
50%	3.800000
75%	3.800000
max	4.496000

In [157]:
```
mla.boxplot()
plt.show()
```



In [199]:
```
mla.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

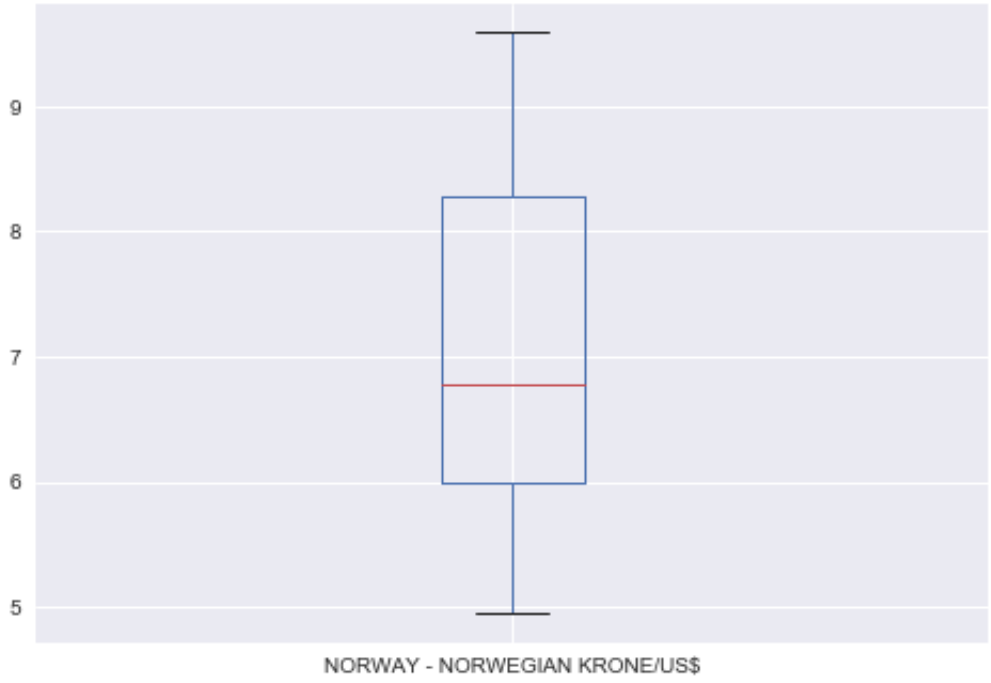


In [61]:
```
nor.describe()
```

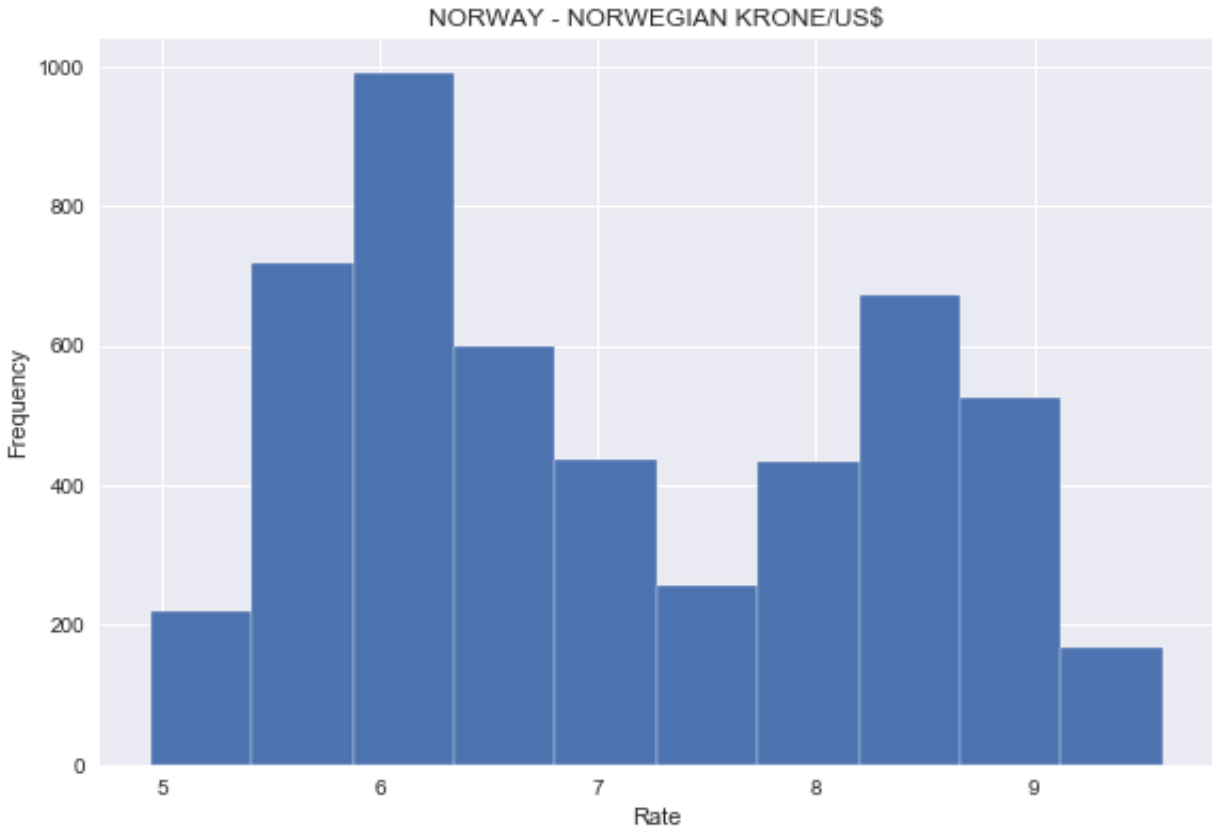
Out[61]:

	NORWAY - NORWEGIAN KRONE/US$
count	5015.000000
mean	7.076004
std	1.226730
min	4.946700
25%	5.996600
50%	6.785000
75%	8.279100
max	9.589000

In [158]:
```
nor.boxplot()
plt.show()
```



In [200]:
```
nor.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

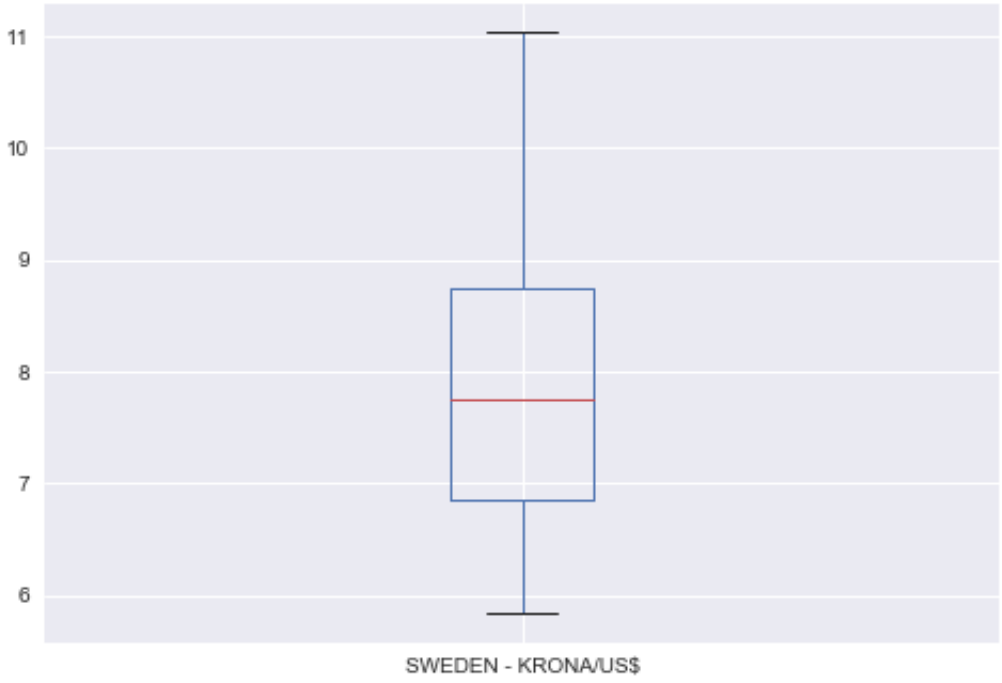


In [62]:
```
swd.describe()
```

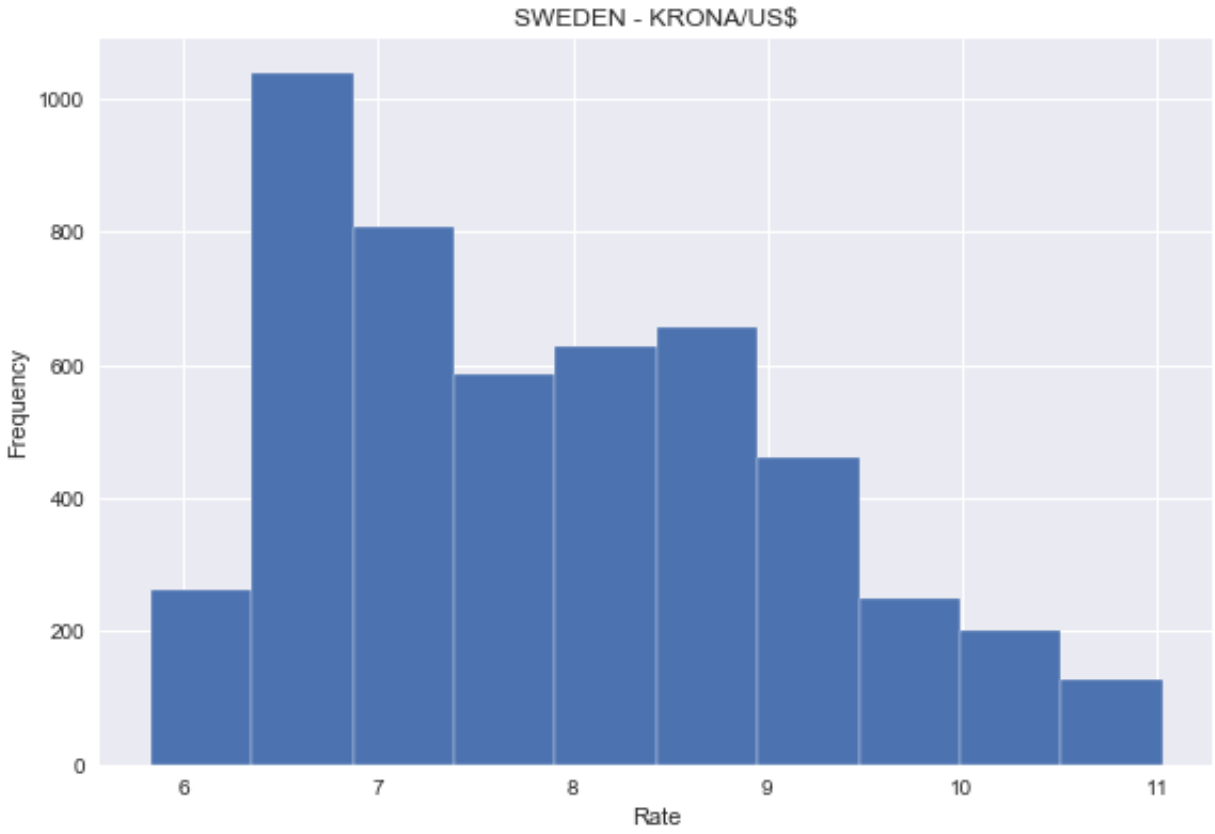
Out[62]:

	SWEDEN - KRONA/US$
count	5015.000000
mean	7.899849
std	1.201841
min	5.834600
25%	6.852700
50%	7.748300
75%	8.744300
max	11.027000

In [159]:
```
swd.boxplot()
plt.show()
```



In [201]:
```
swd.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

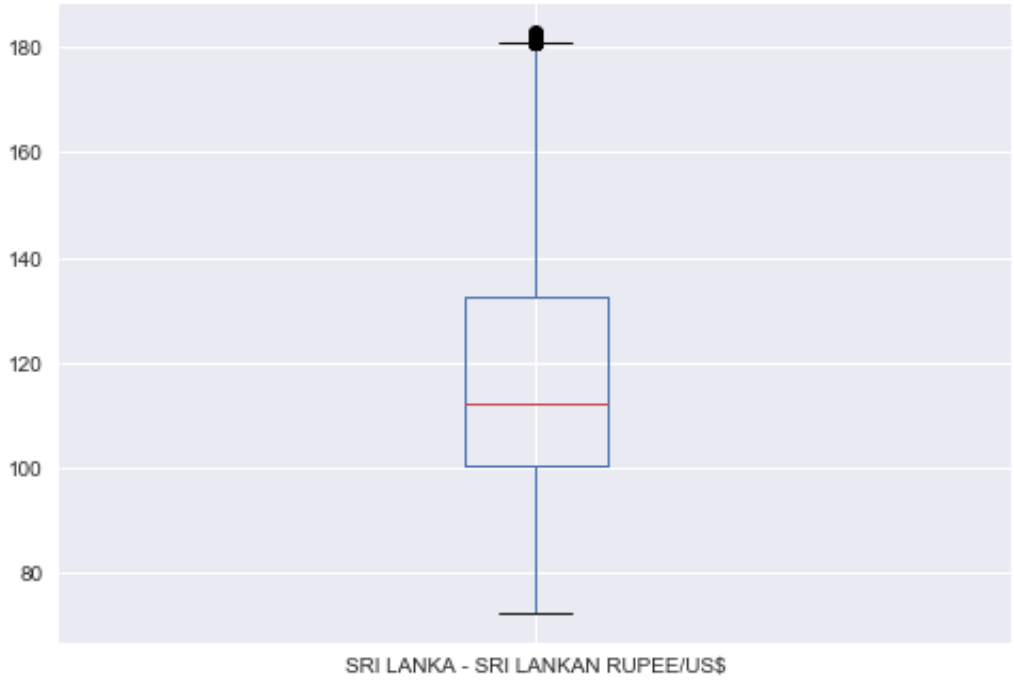


In [63]:
```
srk.describe()
```

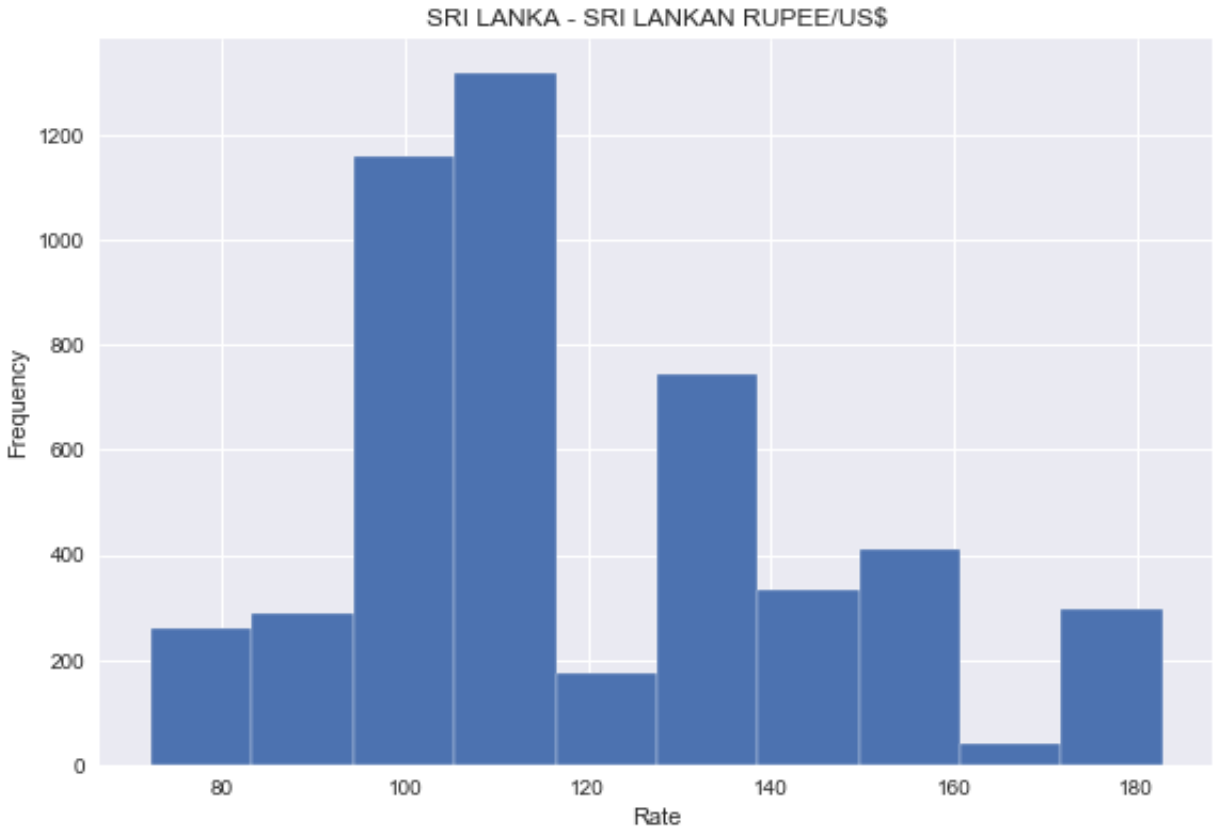
Out[63]:

	SRI LANKA - SRI LANKAN RUPEE/US$
count	5015.000000
mean	119.116291
std	25.352131
min	72.300000
25%	100.380000
50%	112.300000
75%	132.650000
max	182.800000

In [160]:
```
srk.boxplot()
plt.show()
```



In [202]:
```
srk.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

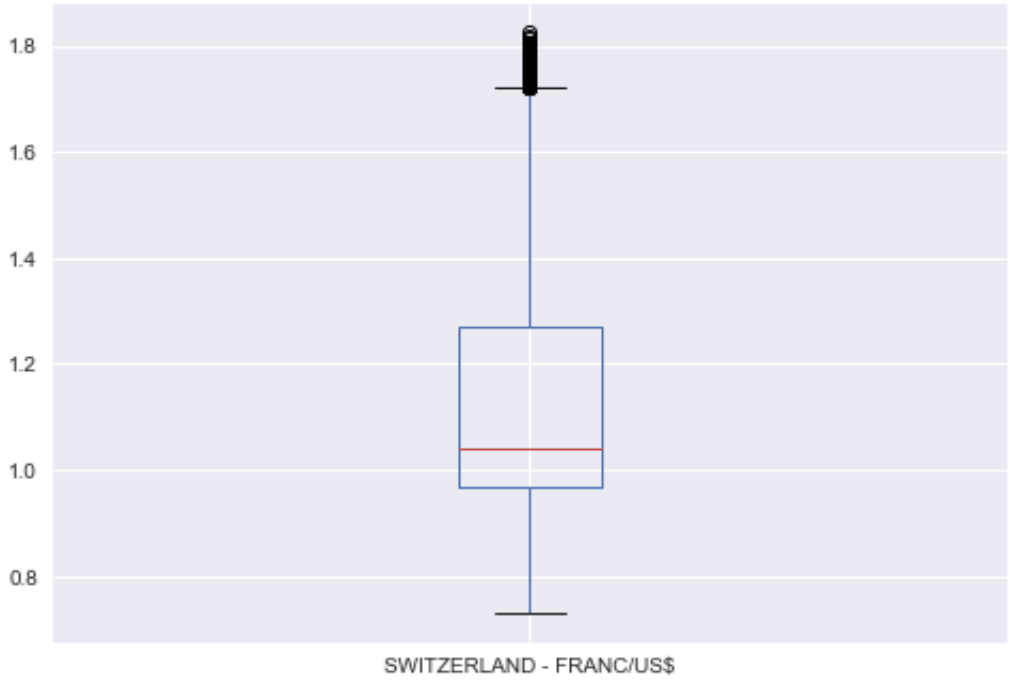


In [64]:
```
swz.describe()
```

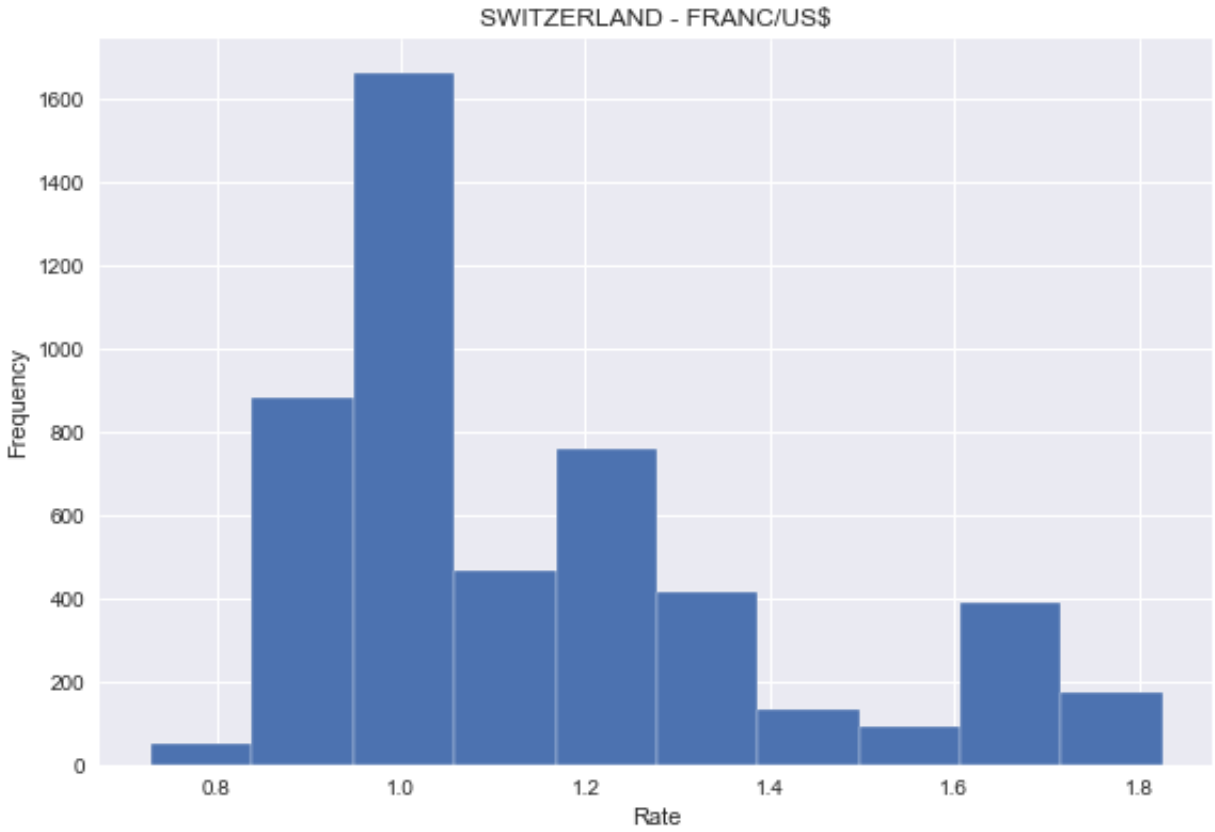
Out[64]:

	SWITZERLAND - FRANC/US$
count	5015.000000
mean	1.150475
std	0.249145
min	0.729600
25%	0.966800
50%	1.040300
75%	1.269150
max	1.825000

In [161]:
```
swz.boxplot()
plt.show()
```



In [203]:
```
swz.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```



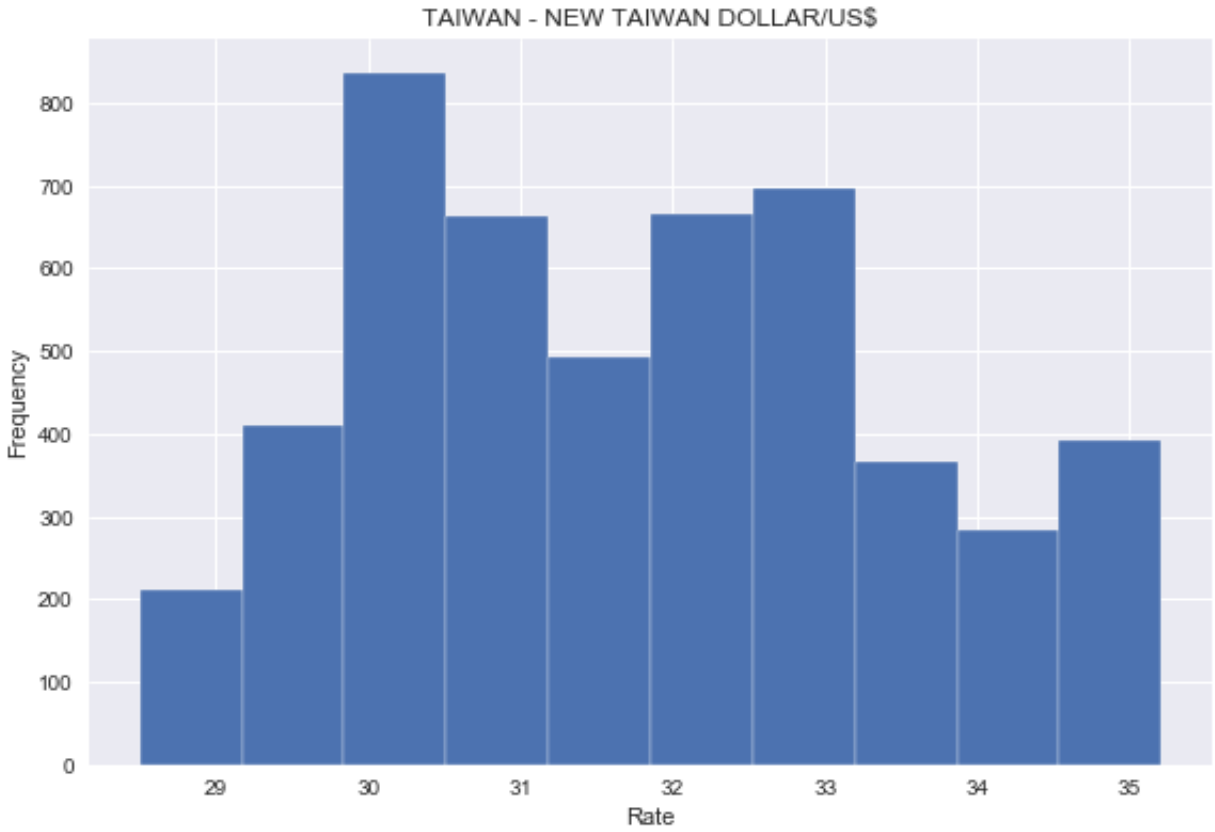
In [65]:
```
tw.describe()
```

Out[65]:

	TAIWAN - NEW TAIWAN DOLLAR/US$
count	5015.000000
mean	31.764830
std	1.671172
min	28.500000
25%	30.350000
50%	31.730000
75%	32.980000
max	35.210000

In [162]:
```
tw.boxplot()
plt.show()
```

In [204]:
```
tw.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```

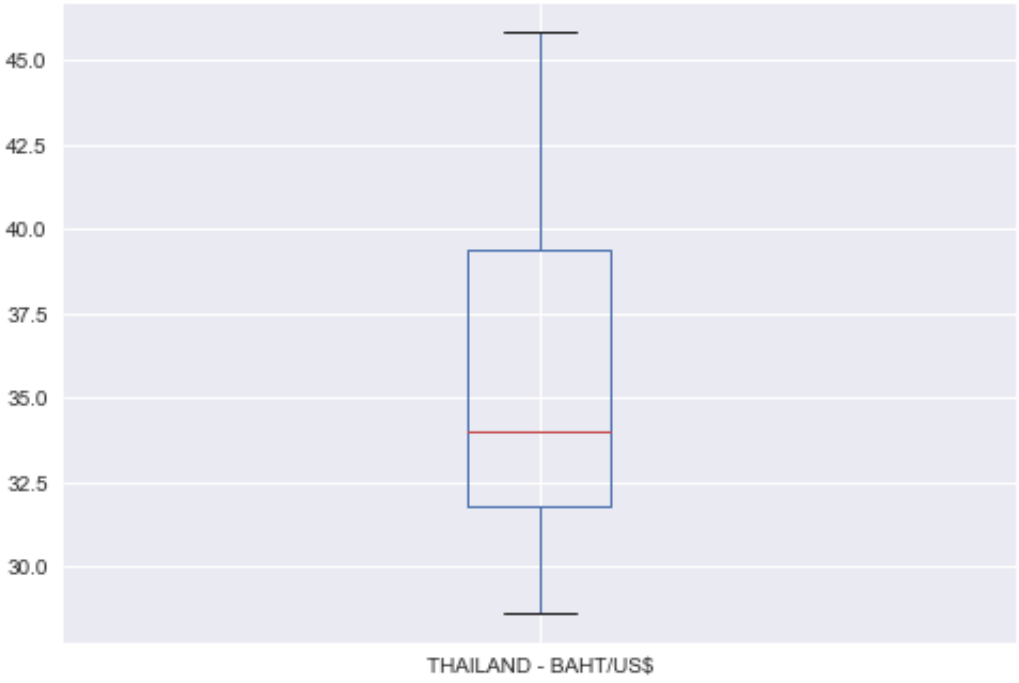


In [76]:
```
thai.describe()
```

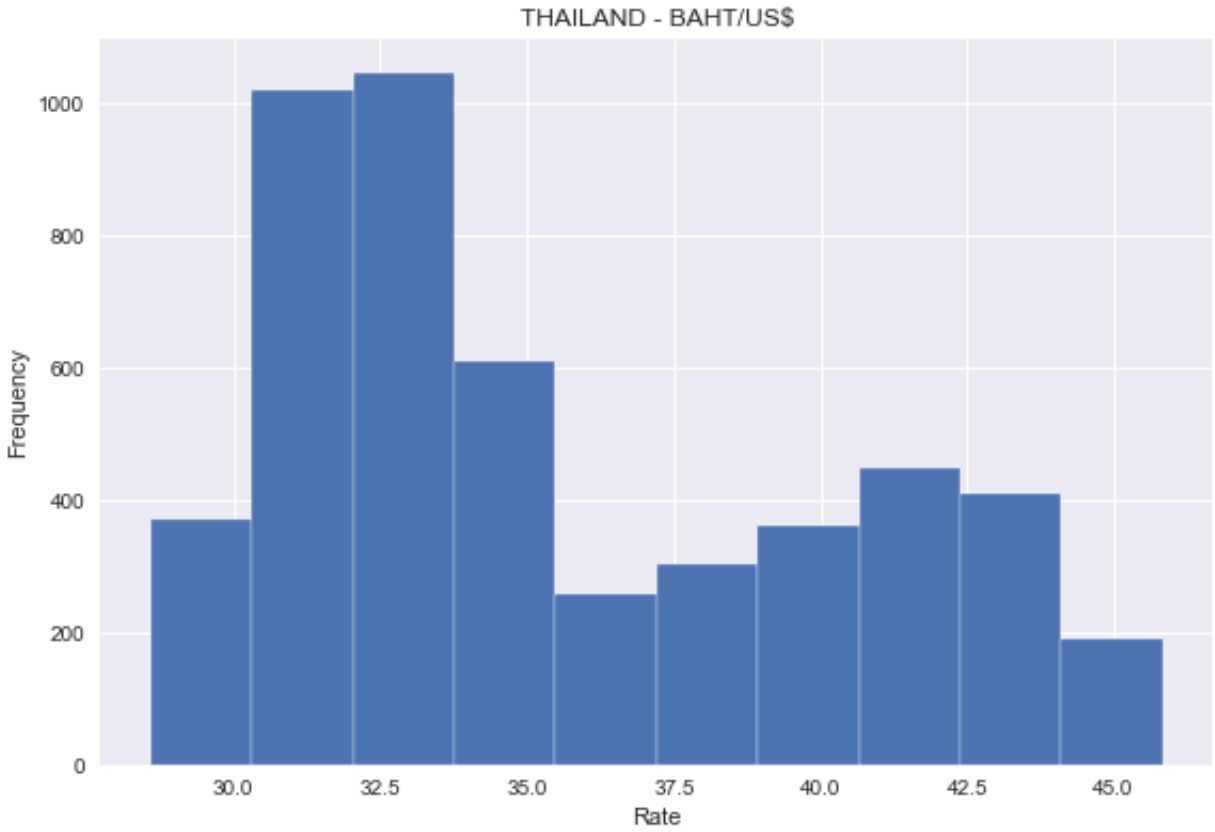
Out[76]:

	THAILAND - BAHT/US$
count	5015.000000
mean	35.522574
std	4.563843
min	28.600000
25%	31.780000
50%	34.010000
75%	39.410000
max	45.820000

In [163]:
```
thai.boxplot()
plt.show()
```

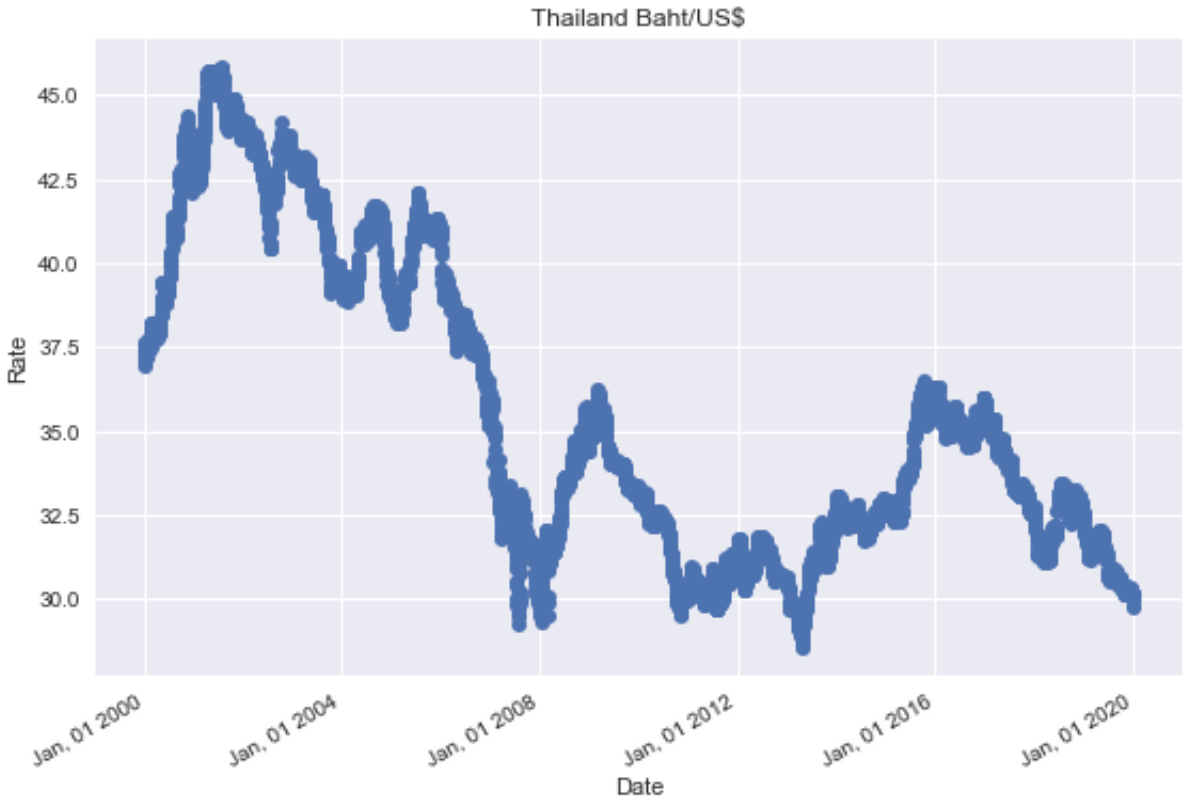


In [205]:
```
thai.hist()
plt.tight_layout()
plt.xlabel('Rate')
plt.ylabel('Frequency')
plt.show()
```



In [135]:
```
#Date Formatter
from matplotlib import pyplot as plt
from matplotlib import dates as mpl_dates
date_format= mpl_dates.DateFormatter('%b, %d %Y')
```

In [142]:
```
#Time Series for Thai Baht/US$

plt.style.use('seaborn')

dates=forex[["Time Serie"]]
y=forex[['THAILAND - BAHT/US$']]

data=forex

plt.plot_date(dates,y,linestyle='solid')
plt.gcf().autofmt_xdate()

plt.gca().xaxis.set_major_formatter(date_format)

plt.title('Thailand Baht/US$')
plt.xlabel('Date')
plt.ylabel('Rate')

plt.tight_layout()

plt.show()
```



In [206]:
```
#Comparing all the statistics for all currency
forex_stat=forex.describe()
print(forex_stat)
forex_stat.to_csv('~/Desktop/project/forex_stat.csv', index = True)
```

```
              Index  AUSTRALIA - AUSTRALIAN DOLLAR/US$  EURO AREA - E
URO/US$  \
count  5015.000000                        5015.000000           5015
.000000
mean   2603.931605                           1.332160              0
.844014
std    1505.402894                           0.269974              0
.126826
min       0.000000                           0.906900              0
.624600
25%    1301.500000                           1.115200              0
.751000
50%    2601.000000                           1.311300              0
.815600
75%    3905.500000                           1.430400              0
.900150
max    5216.000000                           2.071300              1
.209200

       NEW ZEALAND - NEW ZELAND DOLLAR/US$  \
count                          5015.000000
mean                              1.543820
std                               0.337414
min                               1.134600
25%                               1.323800
50%                               1.442600
75%                               1.591200
max                               2.551000

       UNITED KINGDOM - UNITED KINGDOM POUND/US$  BRAZIL - REAL/US$
\
count                                5015.000000        5015.000000
mean                                    0.640466           2.548483
std                                     0.082562           0.724234
min                                     0.473800           1.537500
25%                                     0.587500           1.945650
50%                                     0.636500           2.329100
75%                                     0.692400           3.130000
max                                     0.828700           4.259400

       CANADA - CANADIAN DOLLAR/US$  CHINA - YUAN/US$  \
count                   5015.000000       5015.000000
mean                       1.230503          7.200544
```

```
std                          0.182136          0.820413
min                          0.916800          6.040200
25%                          1.055850          6.475550
50%                          1.237100          6.860000
75%                          1.335700          8.276500
max                          1.612800          8.280000

       HONG KONG - HONG KONG DOLLAR/US$  INDIA - INDIAN RUPEE/US$  .
..  \
count                       5015.000000              5015.000000  .
..
mean                           7.782643                52.726249  .
..
std                            0.027551                 9.678708  .
..
min                            7.708500                38.480000  .
..
25%                            7.756400                45.250000  .
..
50%                            7.780600                48.100000  .
..
75%                            7.799800                62.440000  .
..
max                            7.849900                74.330000  .
..

       SINGAPORE - SINGAPORE DOLLAR/US$  DENMARK - DANISH KRONE/US$
\
count                       5015.000000              5015.000000
mean                           1.480412                 6.286814
std                            0.189003                 0.943430
min                            1.200700                 4.660500
25%                            1.342900                 5.593550
50%                            1.408400                 6.072500
75%                            1.679350                 6.714850
max                            1.854000                 9.005000

       JAPAN - YEN/US$  MALAYSIA - RINGGIT/US$  NORWAY - NORWEGIAN K
RONE/US$  \
count      5015.000000             5015.000000                  501
5.000000
mean        106.589230                3.651129
7.076004
std          13.211723                0.378635
1.226730
min          75.720000                2.937000
4.946700
25%         100.080000                3.290500
5.996600
50%         109.020000                3.800000
```

```
6.785000
75%         116.815000                3.800000
8.279100
max         134.770000                4.496000
9.589000

       SWEDEN - KRONA/US$  SRI LANKA - SRI LANKAN RUPEE/US$  \
count         5015.000000                       5015.000000
mean             7.899849                        119.116291
std              1.201841                         25.352131
min              5.834600                         72.300000
25%              6.852700                        100.380000
50%              7.748300                        112.300000
75%              8.744300                        132.650000
max             11.027000                        182.800000

       SWITZERLAND - FRANC/US$  TAIWAN - NEW TAIWAN DOLLAR/US$  \
count              5015.000000                       5015.000000
mean                  1.150475                         31.764830
std                   0.249145                          1.671172
min                   0.729600                         28.500000
25%                   0.966800                         30.350000
50%                   1.040300                         31.730000
75%                   1.269150                         32.980000
max                   1.825000                         35.210000

       THAILAND - BAHT/US$
count          5015.000000
mean             35.522574
std               4.563843
min              28.600000
25%              31.780000
50%              34.010000
75%              39.410000
max              45.820000

[8 rows x 23 columns]
```

In [ ]: