Efficiency_Ratio

September 29, 2021

1 Efficiency Ratio (ER)

https://www.marketvolume.com/technicalanalysis/efficiencyratio.asp

[1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings("ignore")

# fix_yahoo_finance is used to fetch data
import fix_yahoo_finance as yf
yf.pdr_override()
```

[2]:

```
# input
symbol = 'AAPL'
start = '2018-12-01'
end = '2019-02-01'

# Read data
df = yf.download(symbol,start,end)

# View Columns
df.head()
```

```
[*********************100%***********************]  1 of 1 downloaded
```

[2]:

```
                  Open        High         Low       Close   Adj Close  \
Date
2018-12-03  184.460007  184.940002  181.210007  184.820007  183.324753
2018-12-04  180.949997  182.389999  176.270004  176.690002  175.260513
2018-12-06  171.759995  174.779999  170.419998  174.720001  173.306473
2018-12-07  173.490005  174.490005  168.300003  168.490005  167.126862
2018-12-10  165.000000  170.089996  163.330002  169.600006  168.227890

              Volume
Date
```

```
2018-12-03  40802500
2018-12-04  41344300
2018-12-06  43098400
2018-12-07  42281600
2018-12-10  62026000
```

[3]:

```
n = 10
change = df['Adj Close'].diff(n).abs()
vol = df['Adj Close'].diff().abs().rolling(n).sum()
df['ER'] = change / vol
```

[4]:

```
df.head(20)
```

[4]:

```
                  Open        High         Low       Close   Adj Close  \
Date
2018-12-03  184.460007  184.940002  181.210007  184.820007  183.324753
2018-12-04  180.949997  182.389999  176.270004  176.690002  175.260513
2018-12-06  171.759995  174.779999  170.419998  174.720001  173.306473
2018-12-07  173.490005  174.490005  168.300003  168.490005  167.126862
2018-12-10  165.000000  170.089996  163.330002  169.600006  168.227890
2018-12-11  171.660004  171.789993  167.000000  168.630005  167.265732
2018-12-12  170.399994  171.919998  169.020004  169.100006  167.731934
2018-12-13  170.490005  172.570007  169.550003  170.949997  169.566956
2018-12-14  169.000000  169.080002  165.279999  165.479996  164.141220
2018-12-17  165.449997  168.350006  162.729996  163.940002  162.613678
2018-12-18  165.380005  167.529999  164.389999  166.070007  164.726440
2018-12-19  166.000000  167.449997  159.089996  160.889999  159.588348
2018-12-20  160.399994  162.110001  155.300003  156.830002  155.561188
2018-12-21  156.860001  158.160004  149.630005  150.729996  149.510544
2018-12-24  148.149994  151.550003  146.589996  146.830002  145.642090
2018-12-26  148.300003  157.229996  146.720001  157.169998  155.898438
2018-12-27  155.839996  156.770004  150.070007  156.149994  154.886688
2018-12-28  157.500000  158.520004  154.550003  156.229996  154.966034
2018-12-31  158.529999  159.360001  156.479996  157.740005  156.463837
2019-01-02  154.889999  158.850006  154.229996  157.919998  156.642365

              Volume        ER
Date
2018-12-03  40802500       NaN
2018-12-04  41344300       NaN
2018-12-06  43098400       NaN
2018-12-07  42281600       NaN
2018-12-10  62026000       NaN
2018-12-11  47281700       NaN
2018-12-12  35627700       NaN
2018-12-13  31898600       NaN
2018-12-14  40703700       NaN
```

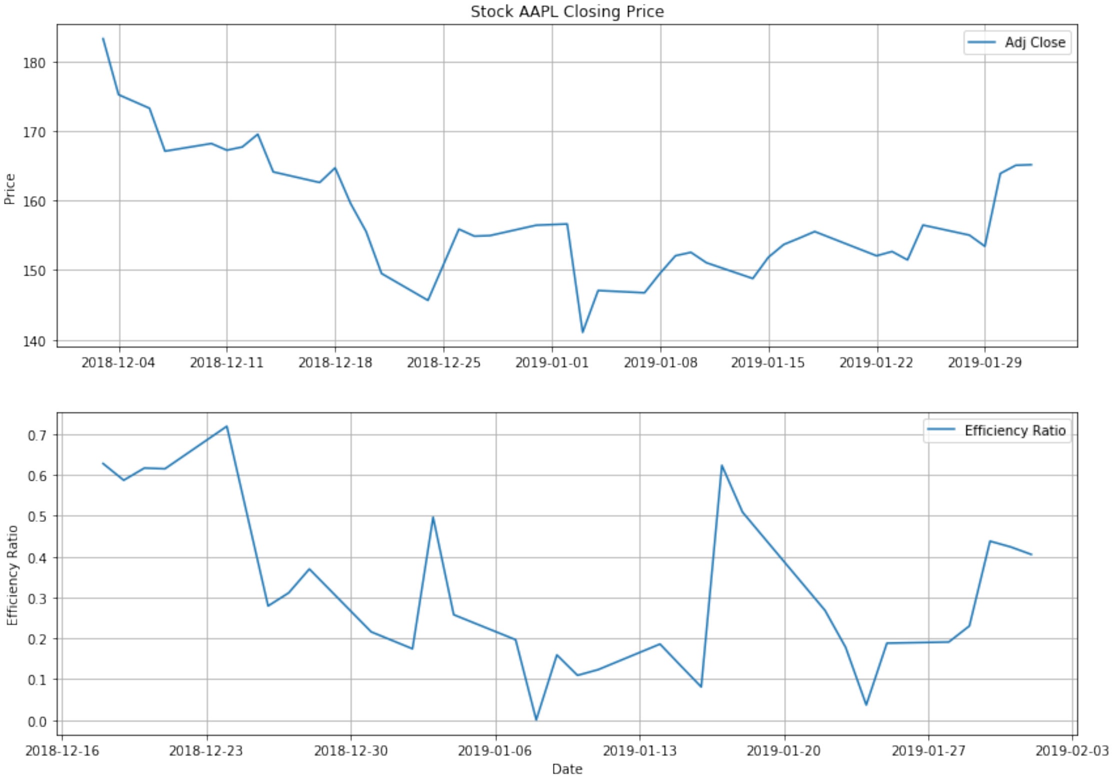
```
2018-12-17  44287900       NaN
2018-12-18  33841500  0.627720
2018-12-19  49047300  0.586924
2018-12-20  64773000  0.616684
2018-12-21  95744600  0.614959
2018-12-24  37169200  0.718978
2018-12-26  58582500  0.279240
2018-12-27  53117100  0.311373
2018-12-28  42291400  0.369664
2018-12-31  35003500  0.215839
2019-01-02  37039700  0.174493
```

[5]:

```python
fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(2, 1, 1)
ax1.plot(df['Adj Close'])
ax1.grid(True, which='both')
ax1.legend(loc='best')
ax1.set_title('Stock '+ symbol +' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['ER'], '-', label='Efficiency Ratio')
#ax2.axhline(y=0,color='r')
ax2.grid(True, which='both')
ax2.set_ylabel('Efficiency Ratio')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[5]:

```
<matplotlib.legend.Legend at 0x2793fa55c50>
```



1.1 Candlestick with ER

[6]:

```python
from matplotlib import dates as mdates
import datetime as dt

dfc = df.copy()
dfc['VolumePositive'] = dfc['Open'] < dfc['Adj Close']
#dfc = dfc.dropna()
dfc = dfc.reset_index()
dfc['Date'] = pd.to_datetime(dfc['Date'])
dfc['Date'] = dfc['Date'].apply(mdates.date2num)
dfc.head()
```

[6]:

```
       Date        Open        High         Low       Close   Adj Close  \
0  737031.0  184.460007  184.940002  181.210007  184.820007  183.324753
1  737032.0  180.949997  182.389999  176.270004  176.690002  175.260513
2  737034.0  171.759995  174.779999  170.419998  174.720001  173.306473
3  737035.0  173.490005  174.490005  168.300003  168.490005  167.126862
4  737038.0  165.000000  170.089996  163.330002  169.600006  168.227890

     Volume   ER  VolumePositive
0  40802500  NaN           False
```

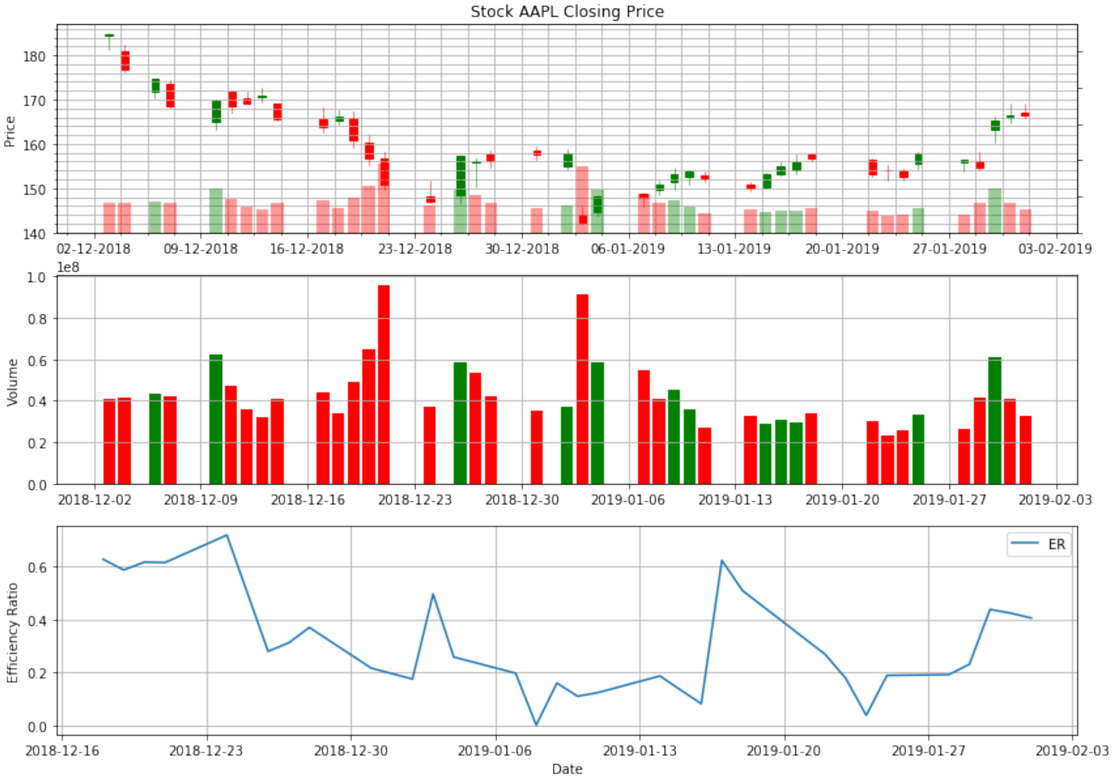
```
1  41344300 NaN           False
2  43098400 NaN            True
3  42281600 NaN           False
4  62026000 NaN            True
```

[7]:

```python
from mpl_finance import candlestick_ohlc

fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(3, 1, 1)
candlestick_ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
 ↪0)
ax1.xaxis_date()
ax1.xaxis.set_major_formatter(mdates.DateFormatter('%d-%m-%Y'))
ax1.grid(True, which='both')
ax1.minorticks_on()
ax1v = ax1.twinx()
colors = dfc.VolumePositive.map({True: 'g', False: 'r'})
ax1v.bar(dfc.Date, dfc['Volume'], color=colors, alpha=0.4)
ax1v.axes.yaxis.set_ticklabels([])
ax1v.set_ylim(0, 3*df.Volume.max())
ax1.set_title('Stock '+ symbol +' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(3, 1, 2)
df['VolumePositive'] = df['Open'] < df['Adj Close']
ax2.bar(df.index, df['Volume'], color=df.VolumePositive.map({True: 'g', False:␣
 ↪'r'}), label='macdhist')
ax2.grid()
ax2.set_ylabel('Volume')

ax3 = plt.subplot(3, 1, 3)
ax3.plot(df['ER'])
ax3.grid()
ax3.set_ylabel('Efficiency Ratio')
ax3.set_xlabel('Date')
ax3.legend()
```

[7]:

```
<matplotlib.legend.Legend at 0x2793fe57be0>
```


Stock AAPL Closing Price
Price
180
170
160
150
140
02-12-2018
09-12-2018
16-12-2018
23-12-2018
30-12-2018
06-01-2019
13-01-2019
20-01-2019
27-01-2019
03-02-2019
1e8
Volume
1.0
0.8
0.6
0.4
0.2
0.0
2018-12-02
2018-12-09
2018-12-16
2018-12-23
2018-12-30
2019-01-06
2019-01-13
2019-01-20
2019-01-27
2019-02-03
ER
Efficiency Ratio
0.6
0.4
0.2
0.0
2018-12-16
2018-12-23
2018-12-30
2019-01-06
2019-01-13
2019-01-20
2019-01-27
2019-02-03
Date