In [1]:
```
import pandas as pd
import numpy as np
import datetime
import matplotlib.pyplot as plt
%matplotlib inline
plt.style.use('ggplot')  # 使用ggplot绘图风格
```

6.2 金融数据

首先 pip instal pandas_datareader 安装pandas datareader 然后通过datareader读取web金融数据

In [12]:
```
from pandas_datareader import data, wb  # 使用pandas_datareader
start = datetime.datetime(2020, 1, 3)  # 定义获取数据的时间起点
end= datetime.date.today()
cnpc = data.DataReader('000001.sz', 'yahoo', start, end)  # 得到深圳成指数据
cnpc.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 256 entries, 2020-01-03 to 2021-01-21
Data columns (total 6 columns):
High         256 non-null float64
Low          256 non-null float64
Open         256 non-null float64
Close        256 non-null float64
Volume       256 non-null int64
Adj Close    256 non-null float64
dtypes: float64(5), int64(1)
memory usage: 14.0 KB
```

In [13]:
```
cnpc.tail()  # 使用tail方法读取最后5行
```

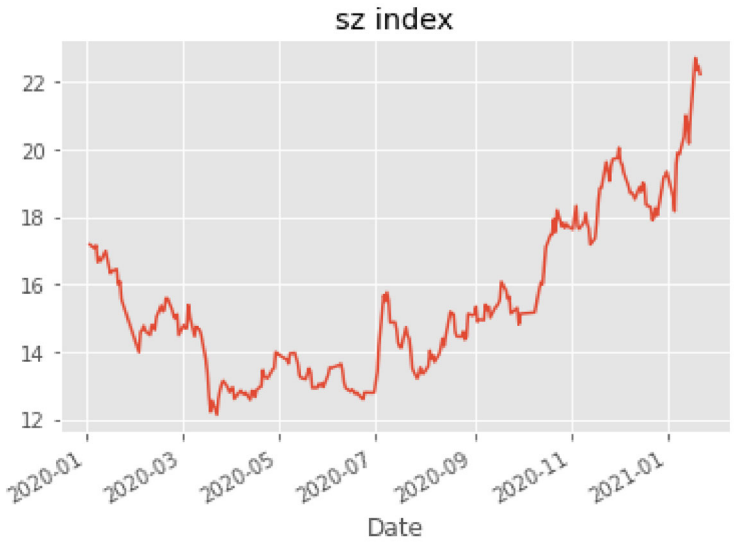
Out[13]:

Date	High	Low	Open	Close	Volume	Adj Close
2021-01-15	21.950001	20.820000	21.000000	21.000000	248068898	21.000000
2021-01-18	22.780001	21.200001	21.200001	22.700001	215730178	22.700001
2021-01-19	22.840000	22.049999	22.510000	22.340000	124208834	22.340000
2021-01-20	22.969999	22.120001	22.150000	22.469999	128079316	22.469999
2021-01-21	22.799999	22.150000	22.500000	22.230000	94477860	22.230000

可使用 plot() 方法生成图表:

In [14]:
```
1  cnpc['Close'].plot()
2  plt.title('sz index')
```

Out[14]: Text(0.5, 1.0, 'sz index')



Pandas 允许在整个 DataFrame 对象上进行向量化数学运算。 例如根据每天收盘价返回对数收益率：

In [30]:
```
1  cnpc['Ret_Loop'] = 0.0  # pandas 添加新一列操作
2  for i in range(1, len(cnpc)):
3      cnpc['Ret_Loop'][i] = np.log(cnpc["Close"][i]/cnpc["Close"][i-1])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\ipykernel_launcher.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-
view-versus-copy)
  This is separate from the ipykernel package so we can avoid doing imports until
```

In [31]:
```
1 cnpc[['Close', 'Ret_Loop']].tail()  # 计算结果
```

Out[31]:

Date	Close	Ret_Loop
2021-01-15	21.000000	0.040326
2021-01-18	22.700001	0.077843
2021-01-19	22.340000	-0.015986
2021-01-20	22.469999	0.005802
2021-01-21	22.230000	-0.010738

也可以使用向量化方法

In [33]:
```
1 %  time cnpc['Return'] = np.log(cnpc["Close"]/cnpc["Close"].shift(1))
```

```
Wall time: 573 µs
```

In [34]:
```
1 cnpc[['Close', 'Ret_Loop', 'Return']].tail()  # 计算结果
```

Out[34]:

Date	Close	Ret_Loop	Return
2021-01-15	21.000000	0.040326	0.040326
2021-01-18	22.700001	0.077843	0.077843
2021-01-19	22.340000	-0.015986	-0.015986
2021-01-20	22.469999	0.005802	0.005802
2021-01-21	22.230000	-0.010738	-0.010738

删除列操作:

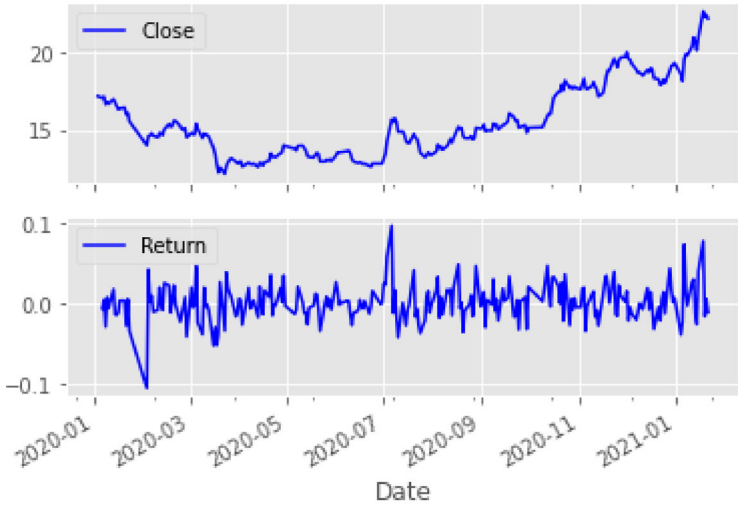
In [35]:
```
1 del cnpc['Ret_Loop']
```

查看 Return 与时间的图表:

In [36]:
```
1 cnpc[['Close', 'Return']].plot(subplots=True, style='b')
```

```
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecation
Warning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().rowspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecation
Warning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().colspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecation
Warning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().rowspan.start instead.
  if not layout[ax.rowNum + 1, ax.colNum]:
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecation
Warning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().colspan.start instead.
  if not layout[ax.rowNum + 1, ax.colNum]:
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecation
Warning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().rowspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecation
Warning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().colspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecation
Warning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().rowspan.start instead.
  if not layout[ax.rowNum + 1, ax.colNum]:
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecation
Warning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases la
ter. Use ax.get_subplotspec().colspan.start instead.
  if not layout[ax.rowNum + 1, ax.colNum]:
```

Out[36]:
```
array([<AxesSubplot:xlabel='Date'>, <AxesSubplot:xlabel='Date'>],
      dtype=object)
```

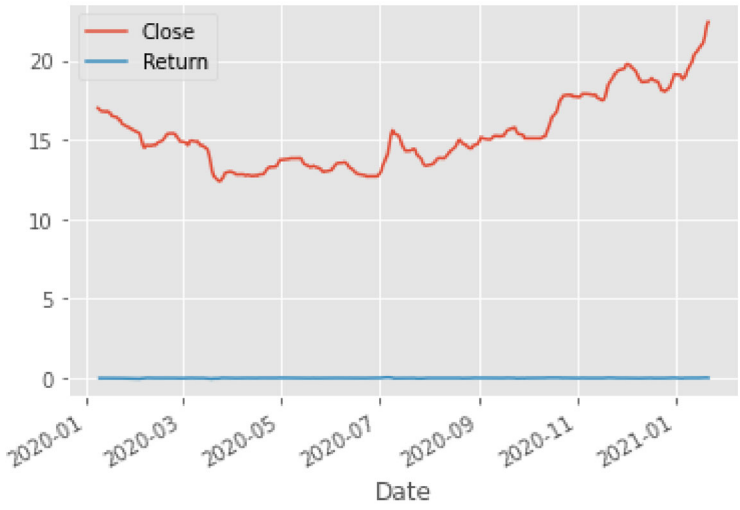


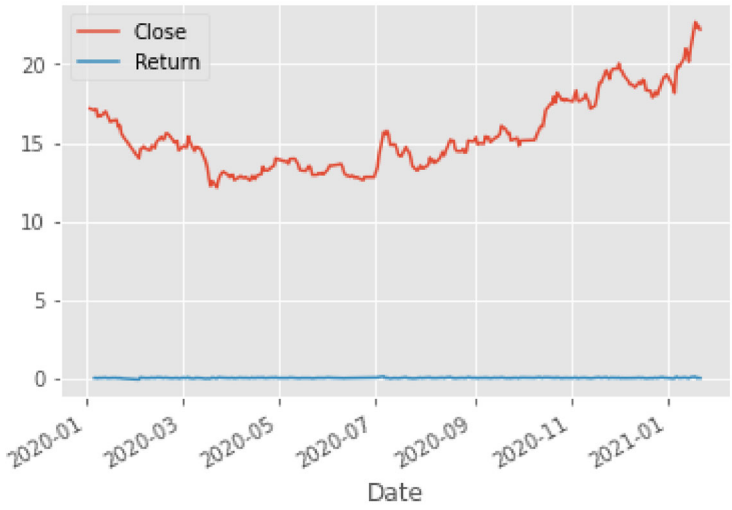
利用Pandas计算滑动平均值：使用 rolling().mean() 函数 其他“滑动”函数：

1. 滑动最大值： rolling().max()
2. 滑动最小值： rolling().min()
3. 滑动相关系数： rollin().corr()

In [43]:

```
#  四天平均
rooling_mean= cnpc.rolling(4).mean()
rooling_mean[['Close', 'Return']].plot()
plt.show()
cnpc[['Close', 'Return']].plot()
plt.show()
```





In [48]:
```
# 12天最大
rooling_max= cnpc.rolling(12).max()
rooling_max[['Close', 'Return']].plot(subplots=True)
plt.show()
cnpc[['Close', 'Return']].plot(subplots=True)
plt.show()
```

```
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecat
ionWarning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases
later. Use ax.get_subplotspec().rowspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:308: MatplotlibDeprecat
ionWarning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases
later. Use ax.get_subplotspec().colspan.start instead.
  layout[ax.rowNum, ax.colNum] = ax.get_visible()
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecat
ionWarning:
The rowNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases
later. Use ax.get_subplotspec().rowspan.start instead.
  if not layout[ax.rowNum + 1, ax.colNum]:
C:\ProgramData\Anaconda3\lib\site-packages\pandas\plotting\_tools.py:314: MatplotlibDeprecat
ionWarning:
The colNum attribute was deprecated in Matplotlib 3.2 and will be removed two minor releases
later. Use ax.get_subplotspec().colspan.start instead.
```

6.3 高频交易

In [ ]:
```
1
```