Tut1-read

June 10, 2021

1 Import Packages

[24]:
```
import pandas as pd
import numpy as np
from scipy import stats
import matplotlib.pyplot as plt
```

2 Reading data from Excel and Data Cleaning

[25]:
```
#Reading Excel file
dt=pd.read_excel("C:\\Users\\rluck\\OneDrive\\UNSW\\Financial Econometrics-S2␣
↪2021\\ASX200-SE-indexes.xlsx")
#Start with 28/7/1995
dta=dt.iloc[0:]
dta.head()
```


[25]:

	Date	ASX200	SSE
0	28/7/1995	2087.8	721.506
1	31/7/1995	2083.3	721.007
2	1995-01-08 00:00:00	2087.6	741.821
3	1995-02-08 00:00:00	2107.0	724.914
4	1995-03-08 00:00:00	2108.2	728.542

[26]:
```
#Renaming Columns
dta_cols =['Date','ASX','SSE']
dta.columns= dta_cols
dta.head()
dta.tail()
```

[26]:

	Date	ASX	SSE
5214	23/7/2015	5590.3	4320.844
5215	24/7/2015	5566.1	4265.340
5216	27/7/2015	5589.9	3903.456
5217	28/7/2015	5584.7	3836.990
5218	29/7/2015	5624.2	3969.366

[27]:
```
#Save the file to hard drive under new name and re-read the new data file (not␣
↪necessary but helpful if you wish to keep a record)
```

[28]:
```
dta.to_excel('C:\\Users\\rluck\\OneDrive\\UNSW\\Financial Econometrics-S2␣
↪2021\\ASX200-SE.xlsx')
dat=pd.read_excel('C:\\Users\\rluck\\OneDrive\\UNSW\\Financial Econometrics-S2␣
↪2021\\ASX200-SE.xlsx')
```

3 Computing Daily Returns

Daily Returns can be computed using the following formula:

$$R = ln(P_t/P_{t-1})$$

To express it in % we multiply the above by 100.

In Python, we can use the following data['R'] = 100.nplog(data['P']/data['P'].shift(1).dropna()

NB: We add shift(1) to show the lag in price and then drop N/A by using dropna() at the end

[29]:
```
#ASX200 Stock Index returns
dat['R_a'] = 100*np.log(dat['ASX']/dat['ASX'].shift(1)).dropna()
#SSE Index returns
dat['R_sse'] =100*np.log(dat['SSE']/dat['SSE'].shift(1)).dropna()
data=dat.dropna()
data.head()
```


[29]:
```
   Unnamed: 0                 Date     ASX      SSE       R_a     R_sse
1           1            31/7/1995  2083.3  721.007 -0.215771 -0.069185
2           2  1995-01-08 00:00:00  2087.6  741.821  0.206191  2.845913
3           3  1995-02-08 00:00:00  2107.0  724.914  0.925005 -2.305495
4           4  1995-03-08 00:00:00  2108.2  728.542  0.056937  0.499225
5           5  1995-04-08 00:00:00  2119.9  735.500  0.553441  0.950526
```

4 Descriptive Statistics

[30]:
```
stats.describe(data['R_a'])
```

[30]:
```
DescribeResult(nobs=5218, minmax=(-8.704293656938496, 5.724441325766271),
mean=0.018991334529736698, variance=0.9267577439903348,
skewness=-0.4858255708371836, kurtosis=6.327508480057597)
```

[31]:
```
stats.describe(data['R_sse'])
```

[31]:
```
DescribeResult(nobs=5218, minmax=(-10.44676691132011, 9.48095053904682),
mean=0.03267575640106423, variance=2.7784345990611756,
skewness=-0.2945797862973655, kurtosis=5.3319081854664265)
```

Kurtosis results in Python will have deducted 3, implying excess Kurtosis is already given. Both SSE and ASX have negatively skewed stock returns distribution and excess kurtosis. Although SSE has higher volatility, it has a higher mean daily return over the sample period.

5 Jarque-Bera Test

[32]:
```python
JB_ASX= stats.jarque_bera(data['R_a'])
JB_ASX
```

[32]:
```
Jarque_beraResult(statistic=8910.05449516528, pvalue=0.0)
```

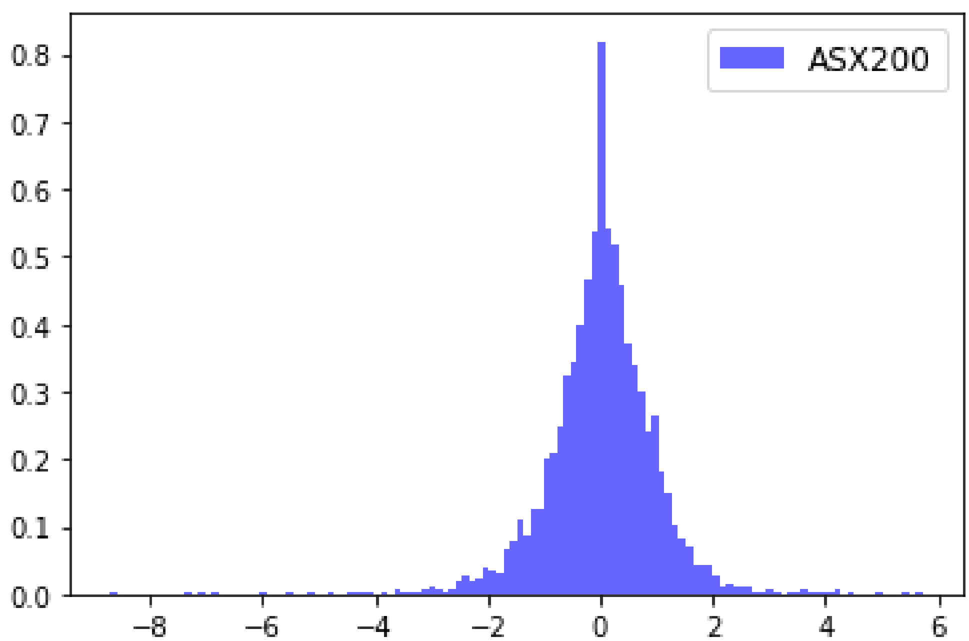
[33]:
```python
JB_SSE= stats.jarque_bera(data['R_sse'])
JB_SSE
```

[33]:
```
Jarque_beraResult(statistic=6256.458943807005, pvalue=0.0)
```

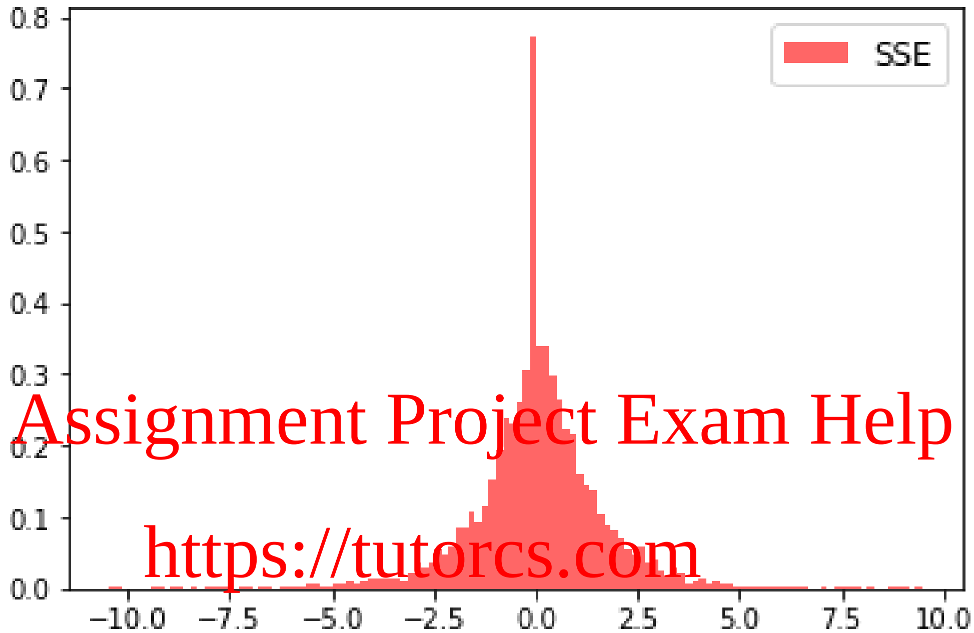
Interpretation: Since pvalue_JB <0.05, we can reject the null hypothesis of normality. We can infer that there is non-normal distribution.

6 Histogram

[75]:
```python
#Plot histogram for ASX200
plt.hist(data['R_a'], bins=120,label='ASX200', density=True, alpha=0.6,␣
↪color='b')
plt.legend(loc='best', fontsize='large')
plt.show()
```



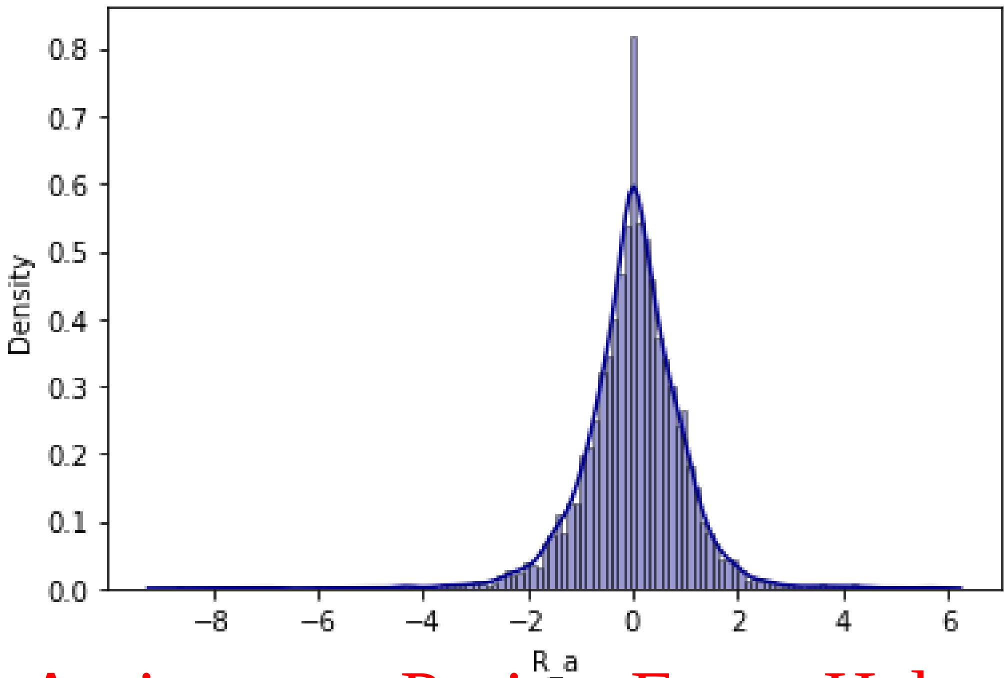
[77]:
```python
#Plot histogram for SSE
plt.hist(data['R_sse'],bins=120,label='SSE', density=True, alpha=0.6, color='r')
plt.legend(loc='best', fontsize='large')
plt.show()
```



[79]:
```python
import seaborn as sns
sns.distplot(data['R_a'],hist=True, kde=True, bins=int(120), color='darkblue',hist_kws={'edgecolor':'black'})
```

```
C:\Users\rluck\anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

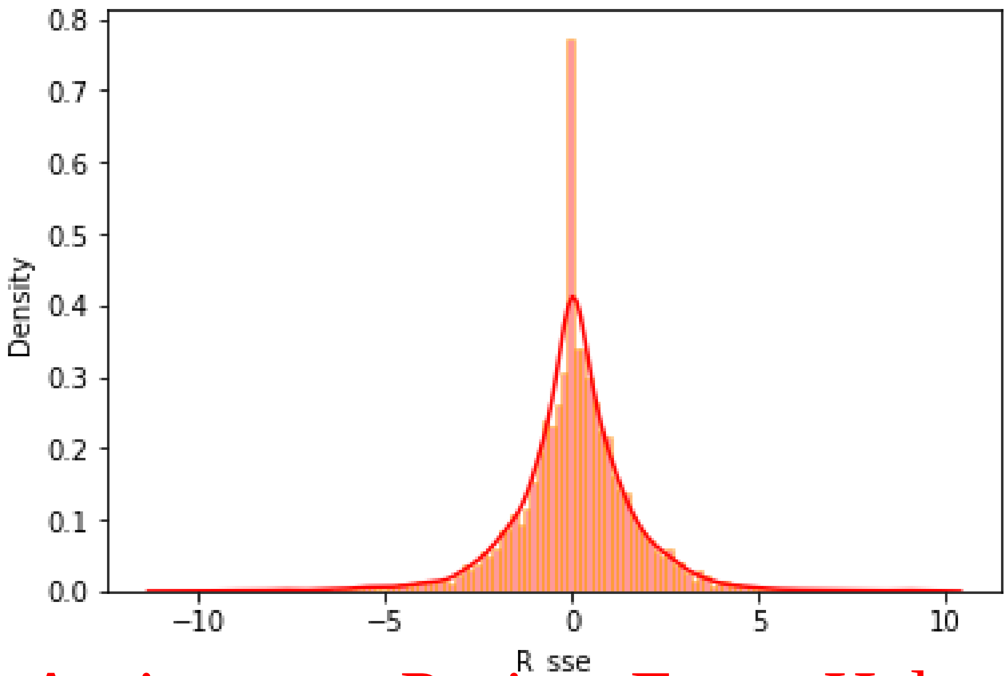
[79]: <AxesSubplot:xlabel='R_a', ylabel='Density'>



[81]:
```
sns.distplot(data['R_sse'], hist=True, kde=True, bins=int(120), color= 'red',␣
    ↪hist_kws={'edgecolor':'orange'})
```

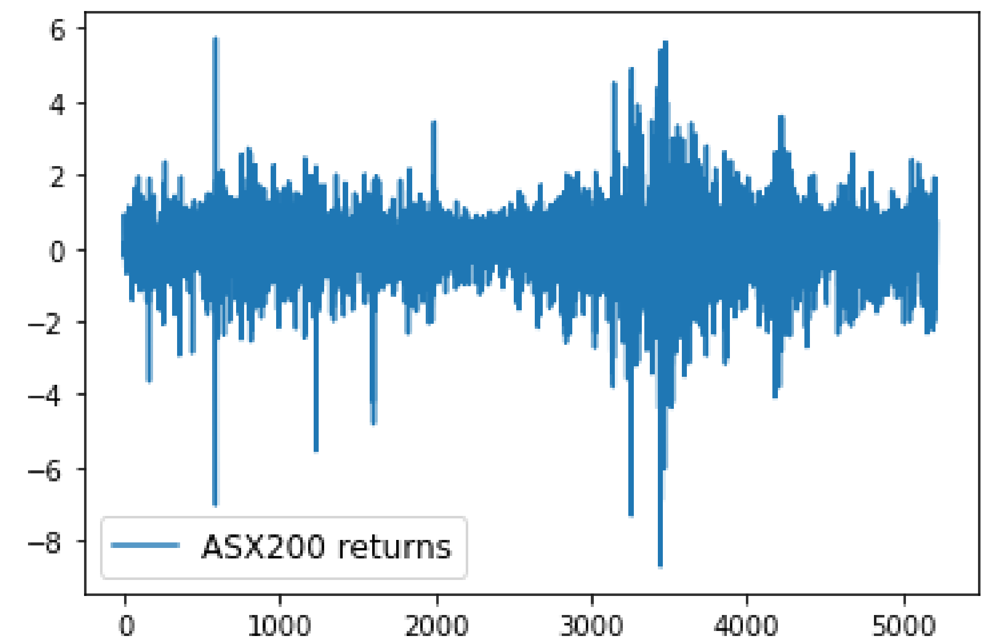
```
C:\Users\rluck\anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[81]:
```
<AxesSubplot:xlabel='R_sse', ylabel='Density'>
```

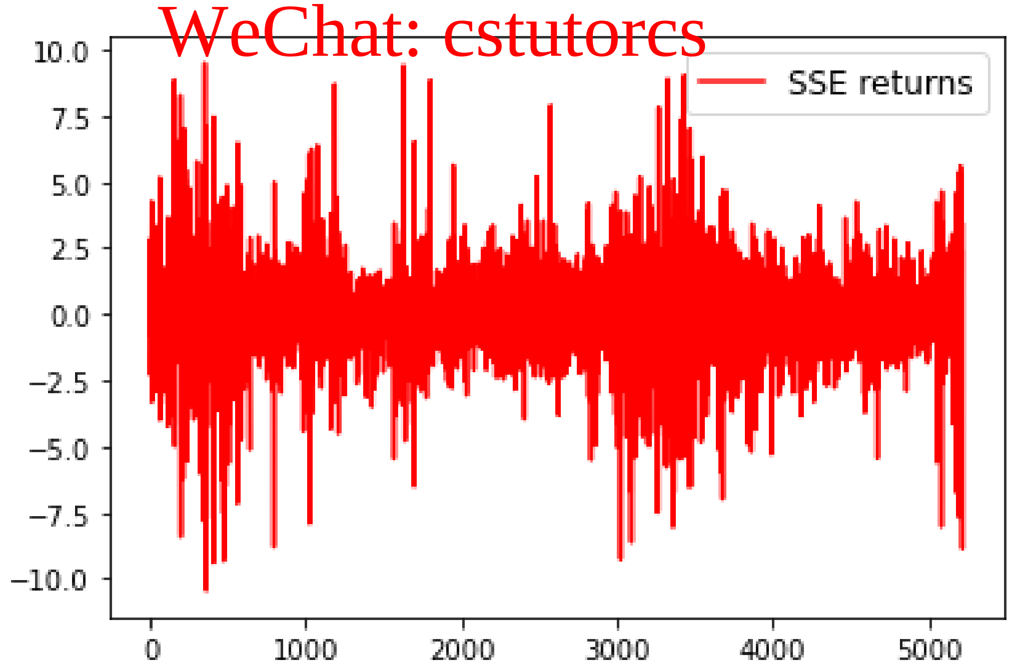


7 Plot

[36]:
```
#Plotting the ASX200 returns series
plt.plot(data.R_a,label='ASX200 returns')
plt.legend(loc='best', fontsize='large')
plt.show()
```



[37]:
```
#Plotting SSE returns series
plt.plot(data.R_sse,label='SSE returns',color='red')
plt.legend(loc='best', fontsize='large')
plt.show()
```

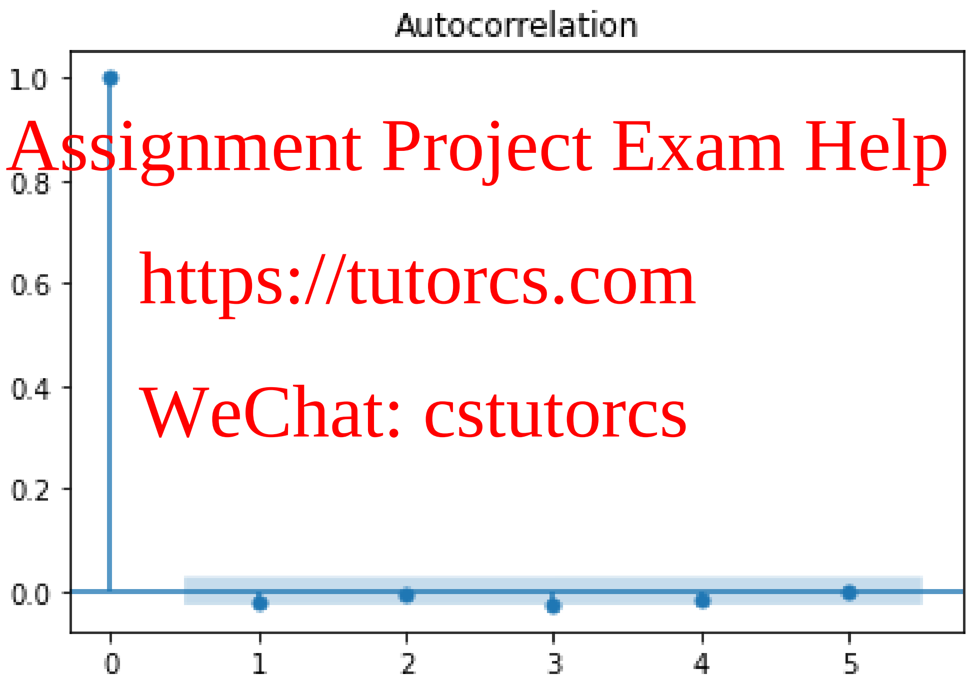
[38]:
```python
#Computing correlation
from scipy.stats import pearsonr
Correlation=pearsonr(data.R_a,data.R_sse)
Correlation
```

[38]:
```
(0.17300419339789885, 2.4234124539930516e-36)
```

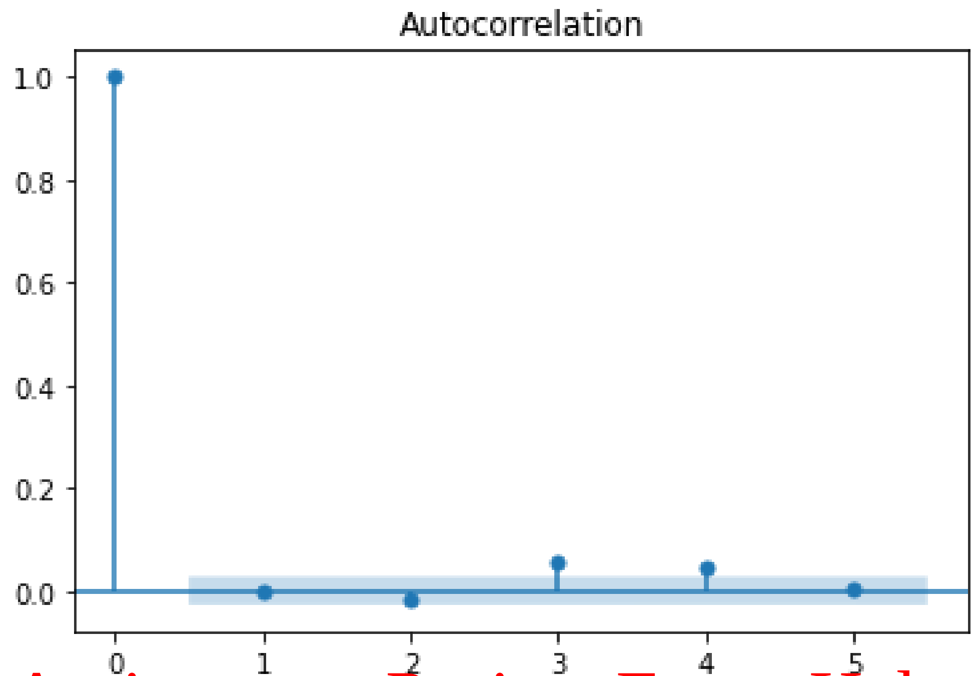
The Pearson's correlation between the two return series of ASX 200 and SSE is 0.17

8 Autocorrelation (ACF) graph

[83]:
```python
from statsmodels.graphics import tsaplots
fig =tsaplots.plot_acf(data['R_a'],lags=5)
plt.show()
```



[84]:
```python
fig =tsaplots.plot_acf(data['R_sse'],lags=5)
plt.show()
```



9 Autocorrelation coefficients at multiple lags

[41]:
```
import statsmodels.api as sm
sm.tsa.acf(data['R_a'])
```



```
C:\Users\rluck\anaconda3\lib\site-packages\statsmodels\tsa\stattools.py:657:
FutureWarning: The default number of lags is changing from 40 tomin(int(10 *
np.log10(nobs)), nobs - 1) after 0.12is released. Set the number of lags to an
integer to  silence this warning.
  warnings.warn(
C:\Users\rluck\anaconda3\lib\site-packages\statsmodels\tsa\stattools.py:667:
FutureWarning: fft=True will become the default after the release of the 0.12
release of statsmodels. To suppress this warning, explicitly set fft=False.
  warnings.warn(
```

[41]:
```
array([ 1.00000000e+00, -2.00819036e-02, -7.45621736e-03, -2.59732010e-02,
       -1.59731301e-02,  6.21230060e-04, -1.76336711e-02, -1.55468191e-02,
       -1.50533801e-02,  2.42828613e-02,  5.09979156e-03, -1.20443357e-02,
       -7.90596922e-03,  1.16266121e-02, -9.44871407e-04, -1.14682419e-03,
       -8.27634852e-03,  1.25941056e-02, -2.52951690e-02,  8.15456959e-03,
       -4.90550380e-03,  1.19753088e-02, -1.13968485e-02,  4.71589237e-03,
       -2.09316328e-02,  2.11629759e-02, -8.17081382e-03,  7.62250565e-03,
        2.73483195e-02, -5.20350748e-03,  3.44330214e-03, -6.66124582e-03,
       -1.02522505e-02,  1.77346608e-02, -1.95879331e-02, -1.29511264e-02,
```

```
        -1.43985714e-02,  1.29777824e-02,  7.13354214e-03, -7.65878735e-03,
         2.65162260e-02])
```

[42]:
```
sm.tsa.acf(data['R_sse'])
```

[42]:
```
array([ 1.00000000e+00, -1.77049756e-03, -1.76342144e-02,  5.79484537e-02,
        4.28343804e-02,  4.74141360e-03, -3.01447017e-02,  1.15330435e-03,
       -4.88721289e-03, -1.90151272e-02,  4.85124876e-03, -1.93491880e-02,
        2.67238022e-02,  2.05308073e-02, -4.08790279e-03,  6.22617857e-02,
        1.52070544e-02,  2.41202057e-02,  6.66707910e-04, -3.56191982e-02,
        3.83645998e-02, -4.14936981e-02,  2.52851825e-02, -1.23808014e-02,
       -1.95174798e-02, -1.47871696e-02,  1.28303299e-02, -3.31447306e-03,
       -1.65438605e-02,  6.25110694e-02,  2.99159141e-03, -4.30915903e-03,
        1.16498707e-02,  8.18669819e-03,  1.35146257e-02,  5.33048366e-04,
        1.83304643e-02,  2.87361987e-03, -1.86447798e-02,  2.46929314e-02,
        4.33252016e-02])
```

[ ]: