

HW1

August 28, 2018

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In [6]: import pandas as pd
import numpy as np
from statsmodels.tsa.arima_model import ARMA

IWV = pd.read_csv("IWV.csv")
SPY = pd.read_csv("SPY.csv")

iwv = IWV["Adj Close"]
spy = SPY["Adj Close"]
iwv = np.array(iwv)
spy = np.array(spy)

iwv_return = (iwv[1:] - iwv[:-1]) / iwv[:-1]
spy_return = (spy[1:] - spy[:-1]) / spy[:-1]

diff = iwv_return - spy_return

In [10]: models = []
for i in range(1, 10):
    models.append(ARMA(diff, order=(i, 0)).fit(dispatch=0, method='mle'))

In [13]: for i in range(10, 13):
    models.append(ARMA(diff, order=(i, 0)).fit(dispatch=0, method='mle'))

In [17]: bics = []
for item in models:
    bics.append(item.bic)

print(bics)

print("the p should choose according to bic: ", bics.index(min(bics))+1)

[-15163.385056038913, -15616.599057850477, -15997.897973219753, -16110.59875213882, -16150.55050
the p should choose according to bic: 8
```

1 So we should choose $p = 8$, and the params are below

```
In [18]: model=models[7]
         print("alpha is ",model.params[0])
         for i in range(8):
             print("beta"+str(i+1)+" is ",model.params[i+1])
```

```
alpha is  -0.673814897709
beta1 is  0.0927563171813
beta2 is  0.0863677700602
beta3 is  0.211486844607
beta4 is  0.119291775162
beta5 is  0.0698540761028
beta6 is  0.147616456685
beta7 is  0.107513353262
beta8 is  0.117660074417
```

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In [ ]:
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