

# Normality of ETFs

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## 1 Introduction

Exchanged-trade funds investing in stocks and bonds are popular investment tools. Throughout the market, many investors are trying to predict the market by examining the relationship between ETFs and their means. By testing its normality, it shows how the values of a variable are distributed and investor are able to define the variability of the ETF.

## 2 Methods

To analyze the the market, we chose eight ETFs from different categories such as value ETF, growth ETF, Mid Cap ETF, Small Cap ETF. We first download data of ETFs from iShares and calculated their mean and standard deviation. Based on the data, we use Python to compute Q-Q plot to compare its end date and returns.

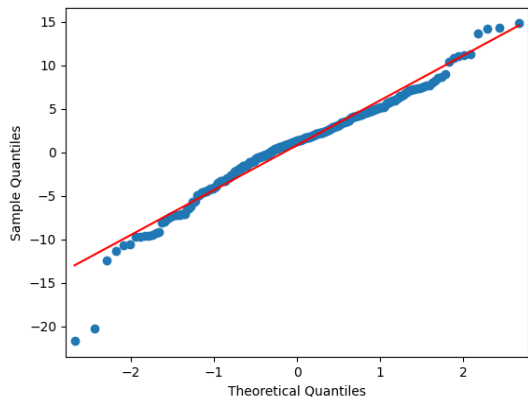
Below is some Python code.

```
import numpy as np
from statsmodels.graphics.gofplots import qqplot
import matplotlib.pyplot as plt
import pandas as pd

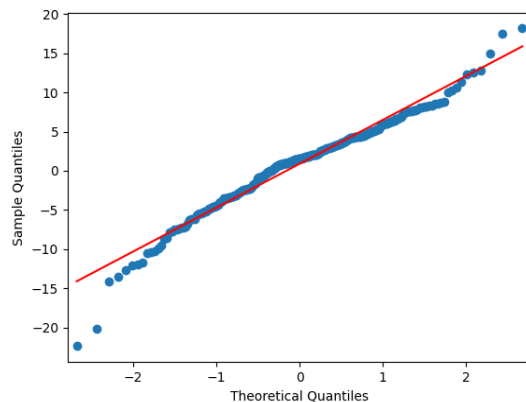
#read data
data1 = pd.read_excel('excel file name')
returns = data1.values[:,1]

#make qqplot
qqplot(returns, line='s')
plt.show()
```

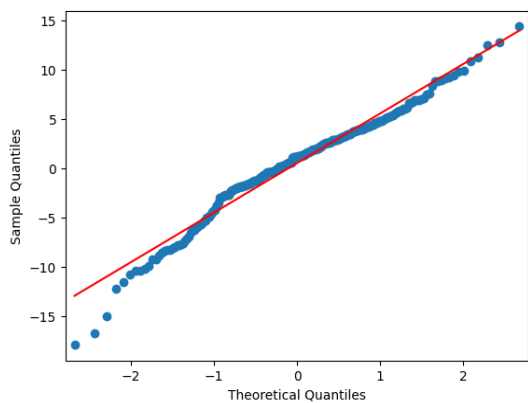
### 3 Figures



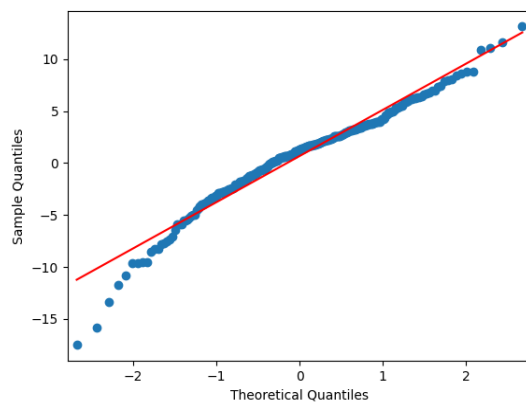
(a) iShares Core SP Mid-Cap ETF



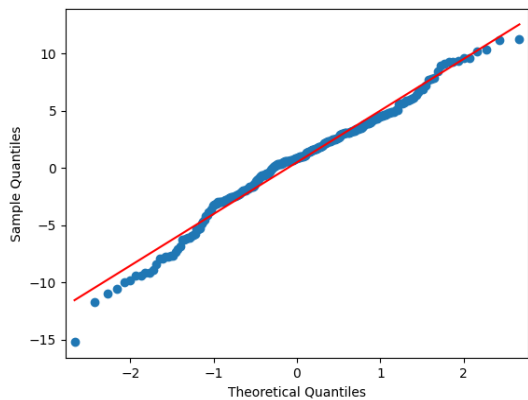
(b) iShares Core SP Small-Cap ETF



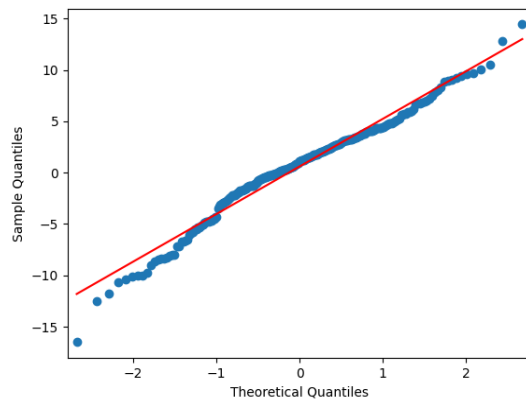
(a) iShares Core SP U.S. Growth ETF



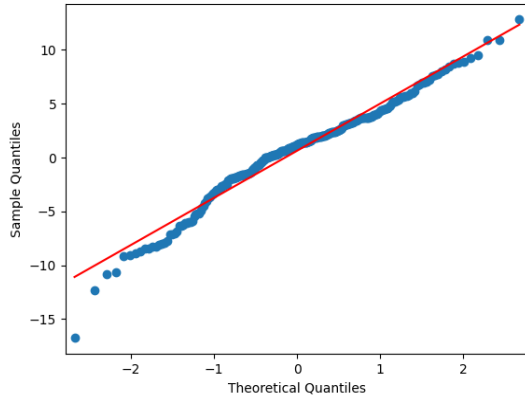
(b) iShares Core SP U.S. Value ETF



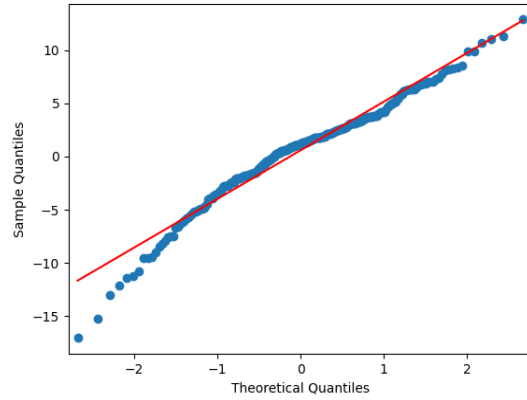
(a) iShares Global 100 ETF



(b) iShares SP 500 Growth ETF



(a) iSharesSP500



(b) iShares SP 500 Value ETF

## 4 Result

Of all ETFs, the SP 500 ETF, and SP 500 Value ETF are not normal distribution. On the other hand, ETFs such as the Core SP Mid Cap ETF, SP Small Cap ETF, Core SP U.S. Growth ETF, Global 100 ETF, Core SP U.S. Value ETF, and SP 500 Growth ETF are normal distribution.

## 5 Conclusion

Based on the computation of Q-Q plots, we found most of ETFs are normally distribute because the data on the Q-Q plot fall on the 45-degree reference line. In this case, the probability of the return value near the mean is higher than the return value far from the mean. It shows the likelihood of the return value will balance out as time goes on.