
DTU

STATISTICAL MODELLING: Theory and practice

# Project 3: Financial data

# Introduction I

| | time | SLV |
|---|---|---|
| 1 | 2006-5-5 | 0.01376 |
| 2 | 2006-5-12 | 0.03286 |
| 3 | 2006-5-19 | -0.12863 |
| ... | ... | ... |
| 452 | 2015-4-24 | -0.03213 |
| 453 | 2015-5-1 | 0.02722 |
| 454 | 2015-5-8 | 0.01875 |

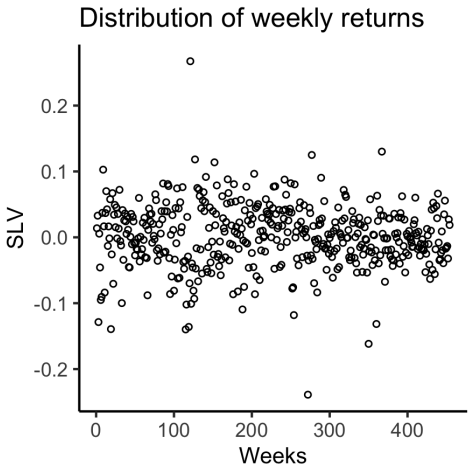
The volatility is calculated as:

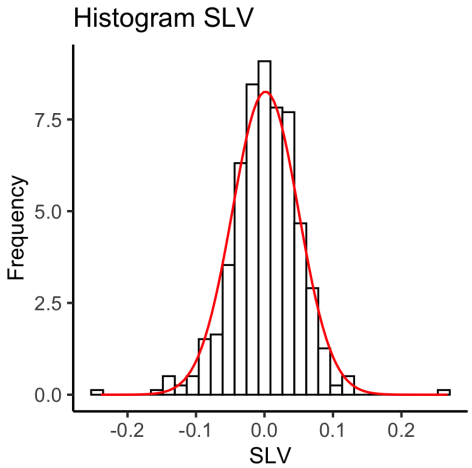
$$volatility = \sqrt{\frac{\sum_{i=1}(SLV_i - \overline{SLV})^2}{n-1}} \quad (1)$$

Summary statistics of Weekly Return (SLV)

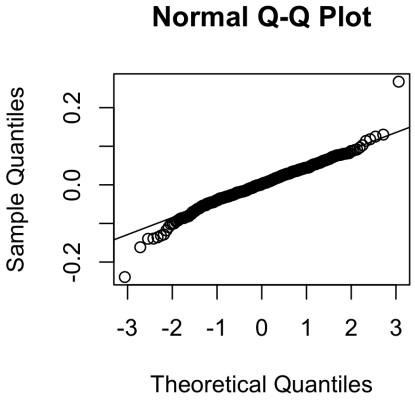
| | SLV |
|---|---|
| Min. : | -0.238893 |
| 1st Qu.: | -0.026350 |
| Median : | 0.002226 |
| Mean : | 0.001468 |
| 3rd Qu.: | 0.033122 |
| Max. : | 0.267308 |

# Introduction II: Normal Model



# Introduction III: Normal Model




Normal distribution, $N(\mu, \sigma^2)$ is a location-scale distribution with standard density.

$$f_0(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2} \qquad (2)$$

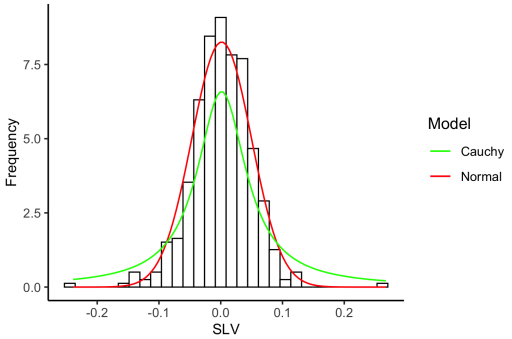
# Hypothetical Model: Cauchy

Cauchy distribution, $\mathit{Cauchy}(\mu, \sigma)$ is also a location-scale distribution with standard density.

$$f_0(x) = \frac{1}{\pi(1 + x^2)} \tag{3}$$

Cauchy is useful for data with heavy tails, characterized by the presence of outliers.

# Final Model




| Model | AIC |
|---|---|
| Normal | -1460 |
| Cauchy | -1363.414 |

# Assignment 1

## Conclusions

- After comparing the both both models through Akaike information criterion (AIC), we can conclude that the normal model shows a better AIC value.

- However, Cauchy distribution could be more suitable for finance data analysis because of the heavy tails probabilities. This would need further analysis in order to make a final decision on the model.

# References

Code of the project can be found at: `https://github.com/laurasansc/statistical_modelling`


- Pawitan Y. In All Likelihood: Statistical Modelling and Inference Using Likelihood. OUP Oxford; 2001. (Oxford science publications).