

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

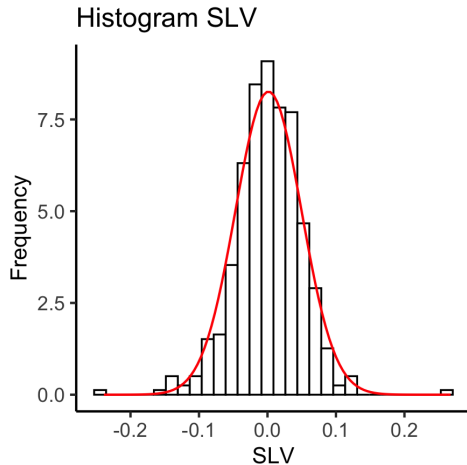
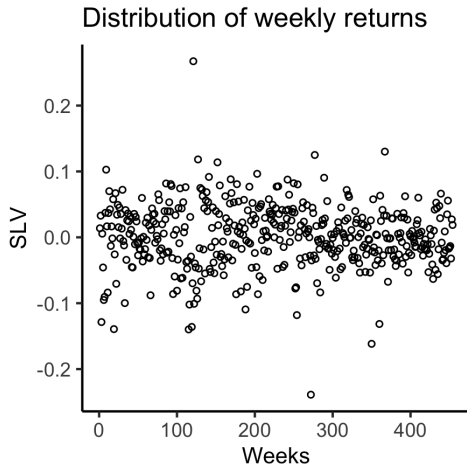
The volatility is calculated as:

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

Summary statistics of Weekly Return (SLV)

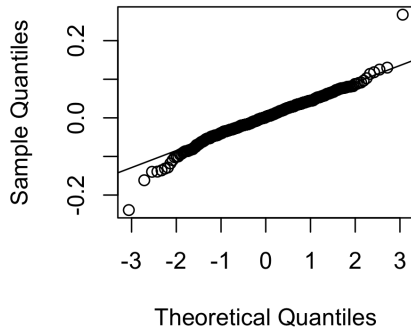
	SLV
Min. :	-0.238893
1st Qu.:	-0.026350
Median :	0.002226
Mean :	0.001468
3rd Qu.:	0.033122
Max. :	0.267308

Introduction II: Normal Model



Introduction III: Normal Model

Normal Q-Q Plot



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

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

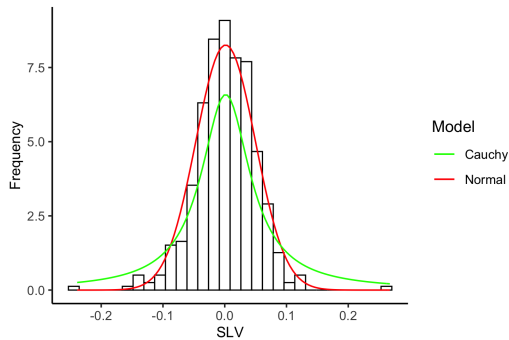
Hypothetical Model: Cauchy

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

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

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

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