

# PP plot against Generalized Extreme Value Distribution

Project ID: No.13

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# Introduction

PP plot of tail values of daily log-returns of portfolio against Generalized Extreme Value Distribution with a global parameter  $\gamma$  estimated with the block maxima method.

# Data source

- The data is the daily closing stock prices of 3 DAX companies, namely **Bayer**, **BMW** and **Siemens**, from 2000-01-01 to 2016-07-11. For each company, there are 4281 observations.
- 3 stocks (**Bayer**, **BMW** and **Siemens**) form an equally-weighted portfolio from the initial dataset.

Remark: All data comes from the YAHOO FINANCE website.

# Procedure

1. Construct a portfolio:  $p = \textit{Bayer} + \textit{Bmw} + \textit{Siemens}$

# Procedure

2. Calculate the parameters of the portfolio by using Block Maxima Model.

- Decompose negative returns  $\{X_t\}_{t=1}^T$  into  $k$  non-overlapping sets.
- Define  $\{Z_j\}_{j=1}^k$  where  $Z_j = \max\{X_{(j-1)n+1}, \dots, X_{jn}\}$ .
- For  $\{Z_j\}_{j=1}^k$ , fit generalized extreme value distribution  $G_\gamma(\frac{x-\mu}{\sigma})$ .
- Get the shape parameter  $\gamma$ , the location parameter  $\mu$  and the scale parameter  $\sigma$ .

# Procedure

## 3.Backtesting with Moving Window Method.

- Use static windows of size  $w = 214$  scrolling in time  $t$  for VaR estimation  $\{X_t\}_{t=s-w+1}^s$  for  $s = w, \dots, T$ .
- Plot the PP plot for static windows of size  $w$ .

# Plots

