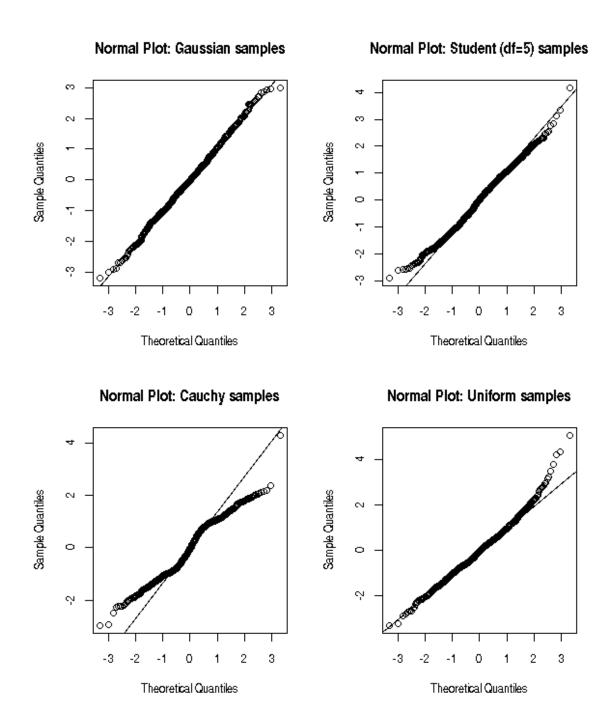
Figure 1 in Elamir and Seheult (2004)

Alberto Viglione

```
First of all load the library:
> library(nsRFA)
and generate the samples from the Normal distribution:
> Nsim = 1000
> n = 60
> campsimulati <- rnorm(n * Nsim)</pre>
> campsimulati <- matrix(campsimulati, ncol = n)</pre>
Then calculate l_3 and SE(l_3):
> lmom <- t(apply(campsimulati, 1, Lmoments))</pre>
> vlmom <- t(apply(campsimulati, 1, varLmoments, matrix = FALSE))</pre>
> 13 <- lmom[, "lca"] * lmom[, "12"]
> s13 <- sqrt(vlmom[, "var.13"])
> 13gaussian <- 13/s13
and plot the results:
> qqnorm(13gaussian, main = "Normal Q-Q Plot for Gaussian samples")
> qqline(13gaussian)
   Repeat the same procedure for the Student distribution:
> campsimulati <- rt(n * Nsim, df = 5)</pre>
> campsimulati <- matrix(campsimulati, ncol = n)</pre>
> lmom <- t(apply(campsimulati, 1, Lmoments))</pre>
> vlmom <- t(apply(campsimulati, 1, varLmoments, matrix = FALSE))
> 13 <- lmom[, "lca"] * lmom[, "12"]
> s13 <- sqrt(vlmom[, "var.13"])
> 13student <- 13/s13
the Cauchy distribution:
> campsimulati <- rcauchy(n * Nsim)</pre>
> campsimulati <- matrix(campsimulati, ncol = n)</pre>
> lmom <- t(apply(campsimulati, 1, Lmoments))</pre>
> vlmom <- t(apply(campsimulati, 1, varLmoments, matrix = FALSE))
> 13 <- lmom[, "lca"] * lmom[, "l2"]
> s13 <- sqrt(vlmom[, "var.13"])
> 13cauchy <- 13/s13
```

and the Uniform distribution:

```
> campsimulati <- runif(n * Nsim)</pre>
> campsimulati <- matrix(campsimulati, ncol = n)</pre>
> lmom <- t(apply(campsimulati, 1, Lmoments))</pre>
> vlmom <- t(apply(campsimulati, 1, varLmoments, matrix = FALSE))</pre>
> 13 <- lmom[, "lca"] * lmom[, "12"]
> s13 <- sqrt(vlmom[, "var.13"])
> 13unif <- 13/s13
  Plot the result:
> layout(matrix(c(1, 2, 3, 4), 2, 2, byrow = TRUE))
> qqnorm(13gaussian, main = "Normal Plot: Gaussian samples")
> qqline(13gaussian)
> qqnorm(13student, main = "Normal Plot: Student (df=5) samples")
> qqline(13student)
> qqnorm(13cauchy, main = "Normal Plot: Cauchy samples")
> qqline(13cauchy)
> qqnorm(13unif, main = "Normal Plot: Uniform samples")
> qqline(13unif)
```



Normal quantile plots and added line for N=1000 simulated values of $l_3/SE(l_3)$ from Gaussian, Student(5), Cauchy and Uniform samples of size n=60.

References

Elamir, E.A.H., and Seheult, A.H. (2004). Exact variance structure of sample L-moments. *Journal of Statistical Planning and Inference*, 124:337–359.