

# RND (Risk Neutral Density) Package R in Finance 2013

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## What is the RND Package & what is it good for?

- Extracts the probability density implied by market options
- The density gives us an idea of the market participants' expectations.
- VIX is an special case.

## What does the package contain?

Currently:

- A basic non-parametric estimator
- Single lognormal (Black-Scholes-Merton)
- Generalized beta
- Mixture of lognormals
- MOE (Mother Of all Extractions) for practitioners

Future:

- More non-parametric methods
- Detailed documentation
- American options
- Data?

## Code Snippet for the output:

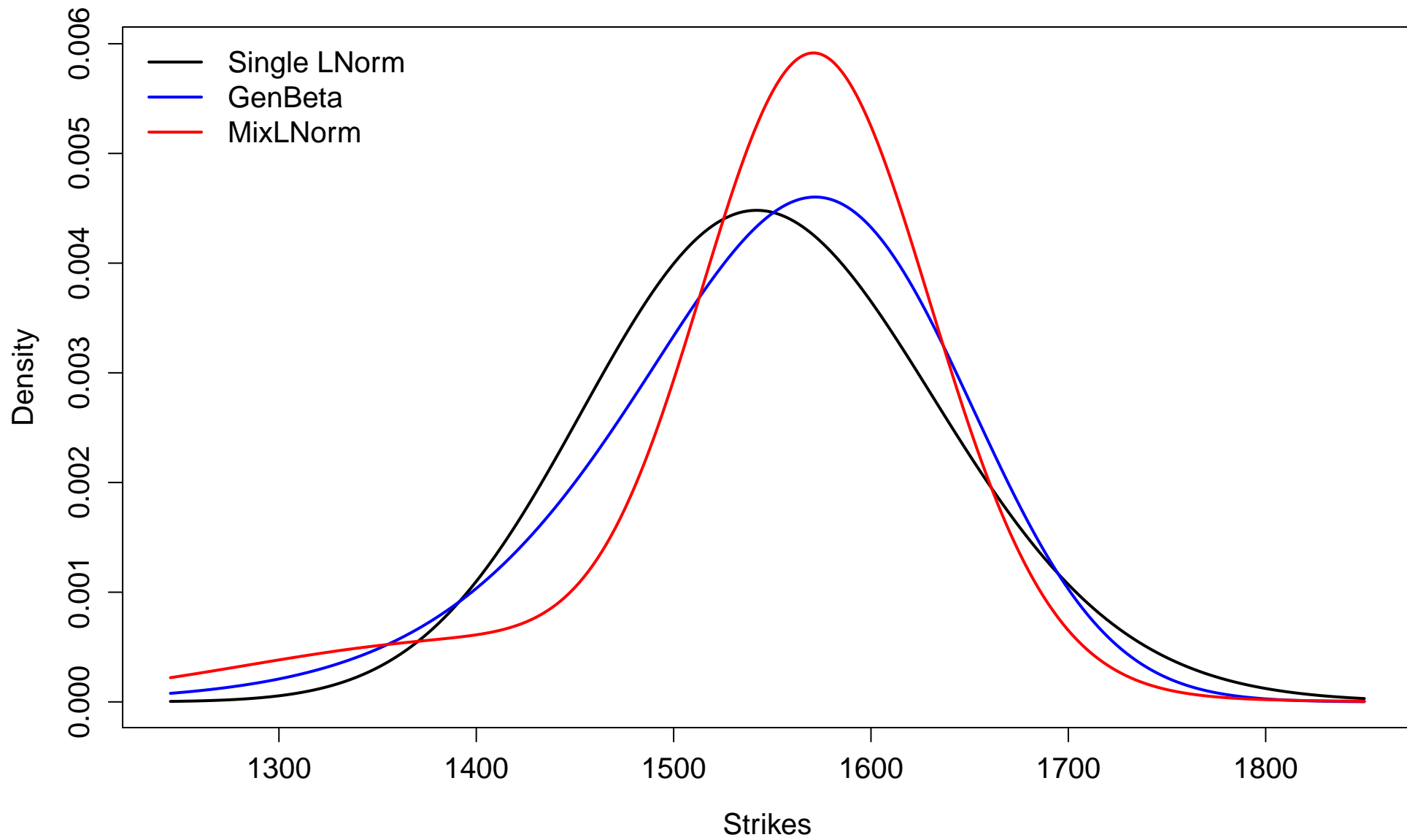
```
> library(RND)
> c.data = read.table("calls-2013-04-19.txt", header=T)
> p.data = read.table("puts-2013-04-19.txt", header=T)
> te = 62/365
> s0 = 1555
> r = 0.0077
> market.calls = c.data$calls
> market.puts = p.data$puts
> call.strikes = c.data$k
> put.strikes = p.data$k
> MOE(market.calls, call.strikes, market.puts,
+ put.strikes, s0, r , te, "my-analysis")
```

## Summary

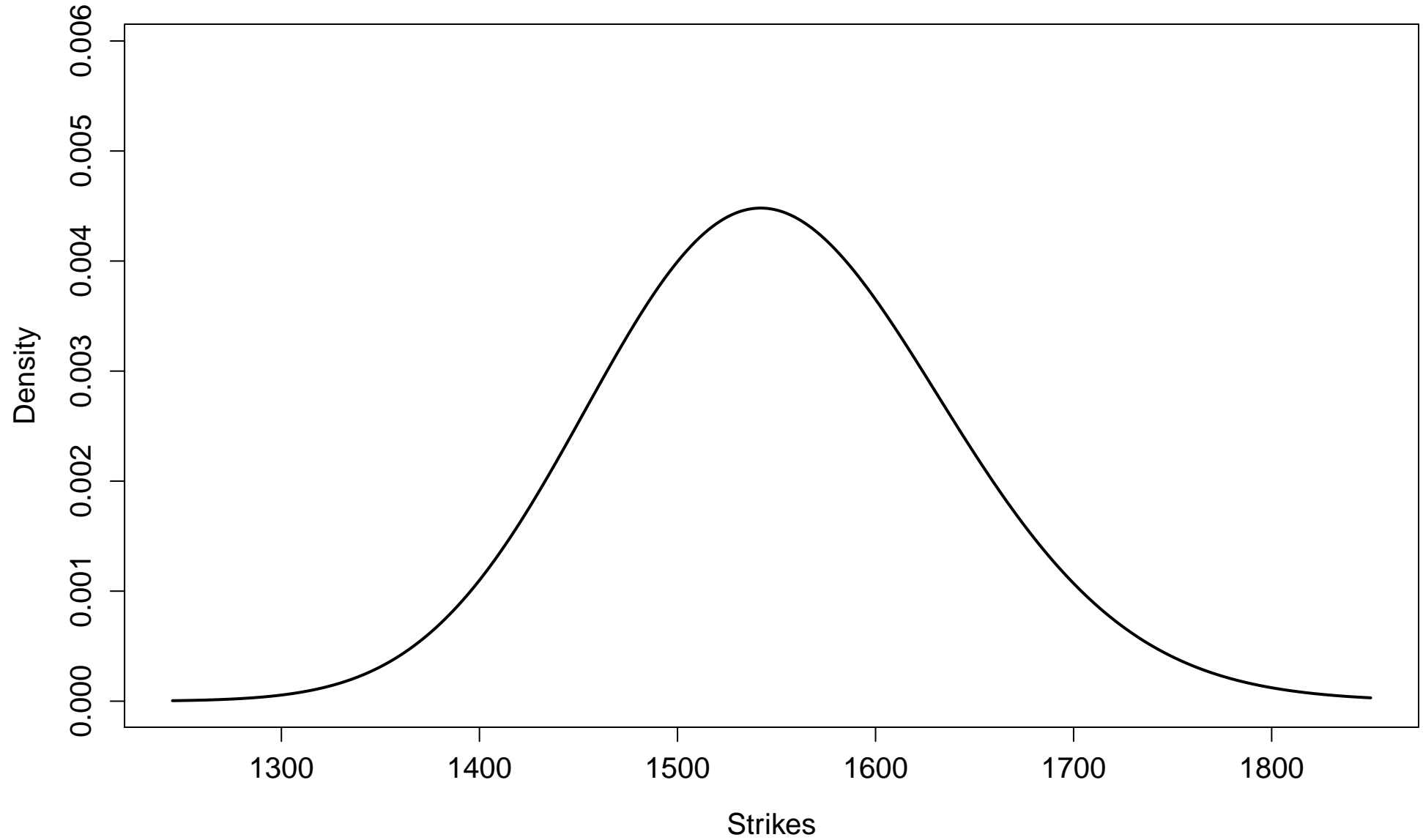
- RND can help you see a richer picture.
- Kurtosis, skewness, etc can be computed.
- Research? Trading?
- Great research:  
*“Recovering an Asset’s Implied PDF from Option Prices: An Application to Crude Oil during the Gulf Crisis”* by W. R. Melick and C. P. Thomas, Journal of Financial and Quantitative Analysis, Vol. 32, No. 1 (Mar., 1997), pp. 91-115

# THANK YOU!

Contact: [kh@zoolytics.com](mailto:kh@zoolytics.com)

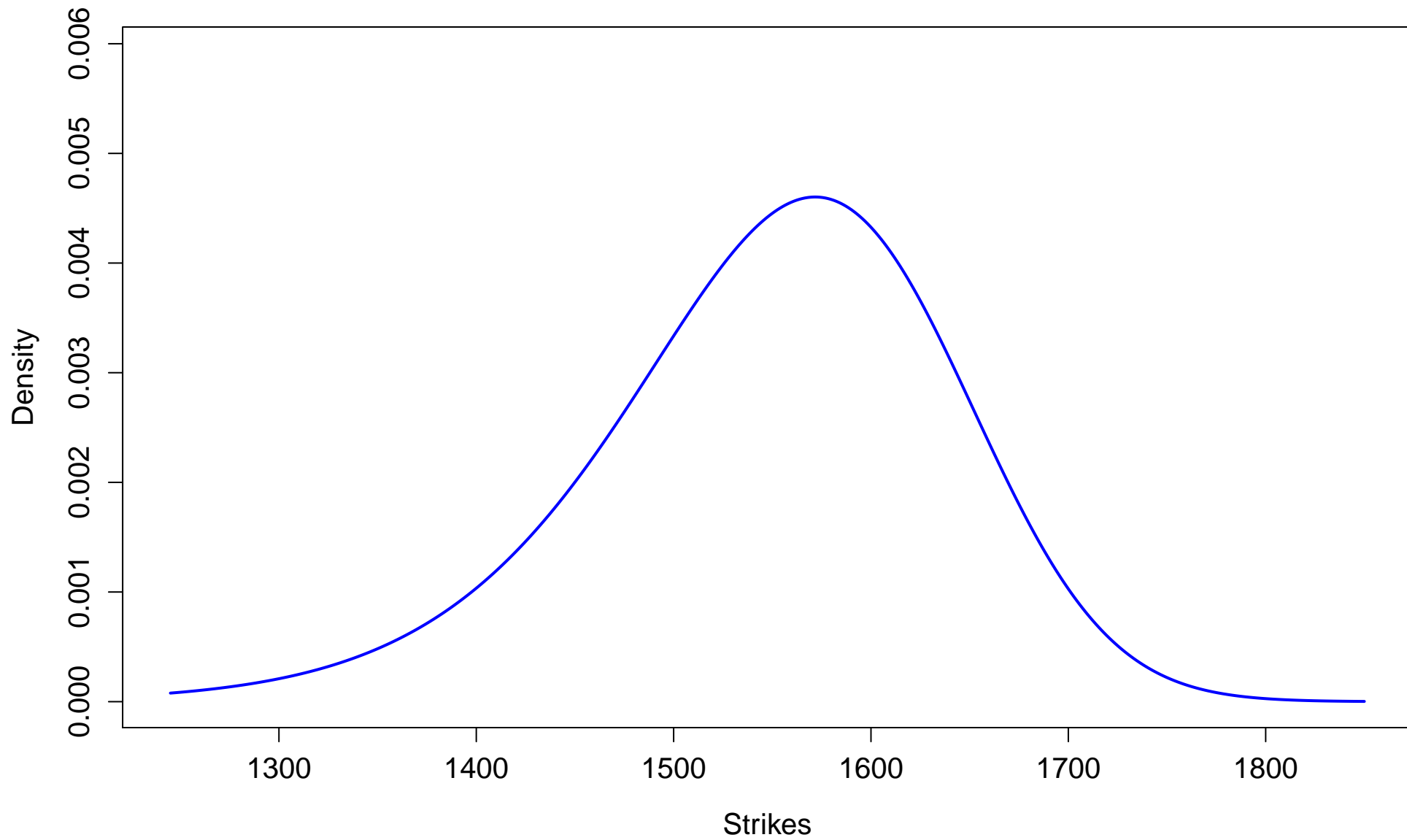


# Single LNorm

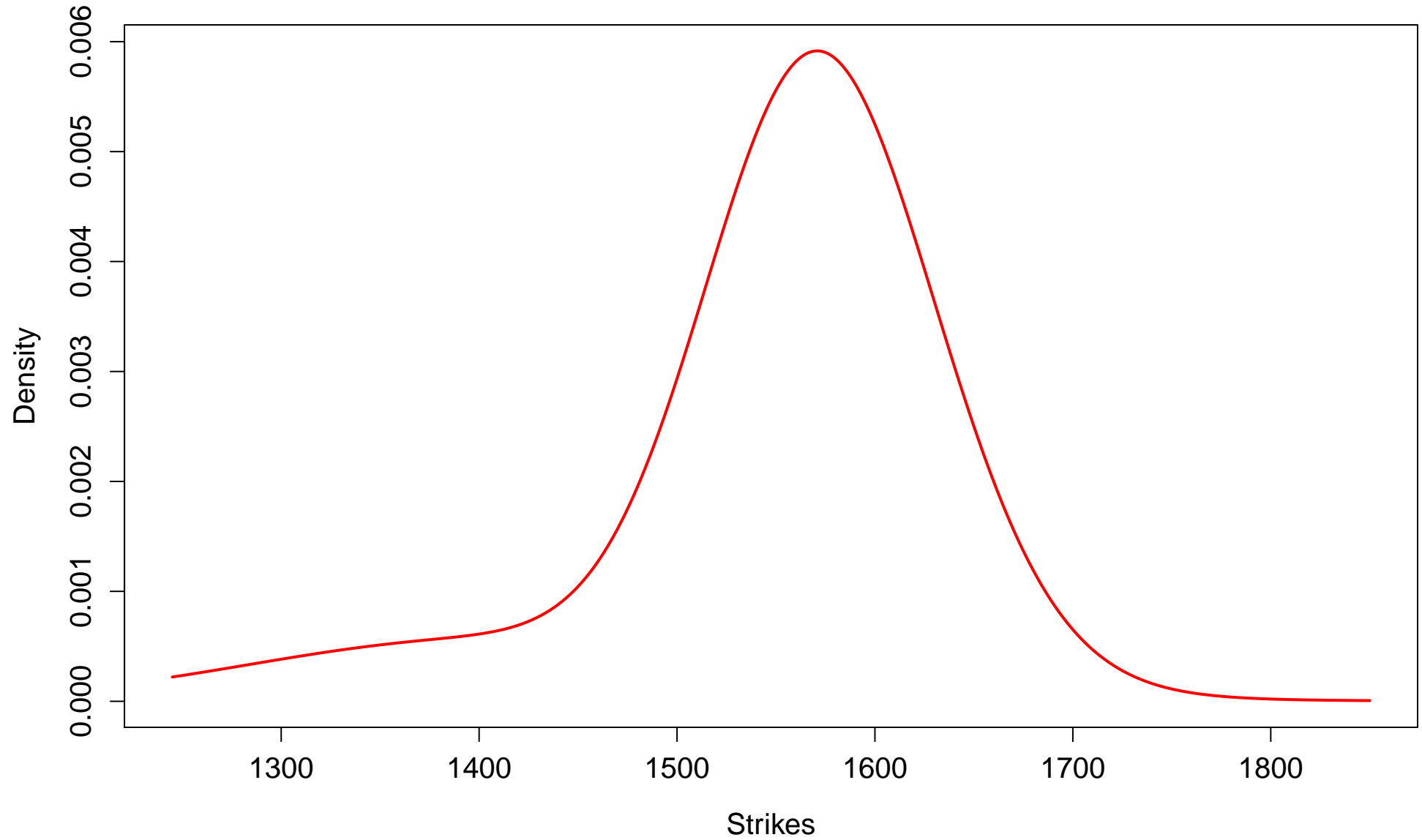




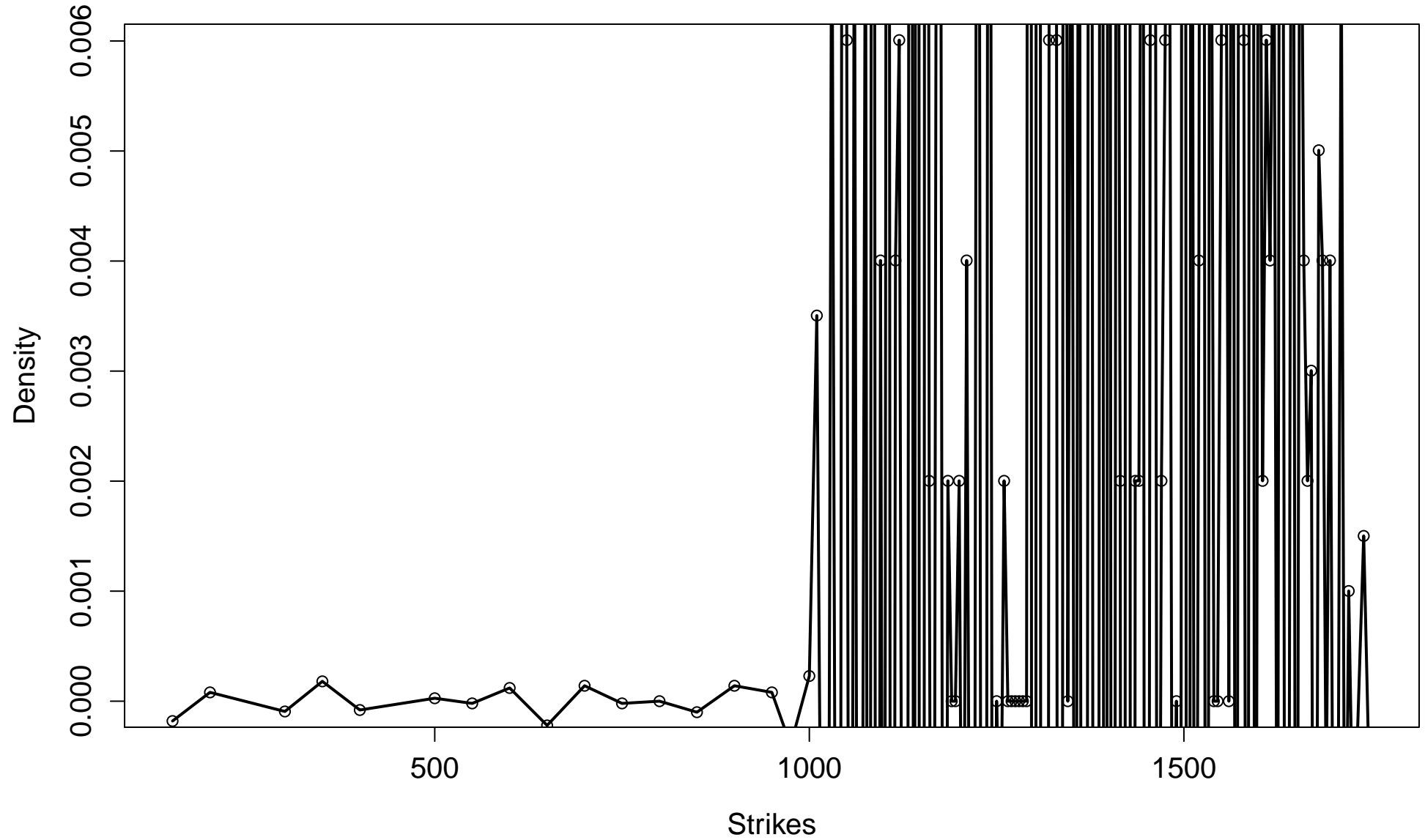
# GenBeta



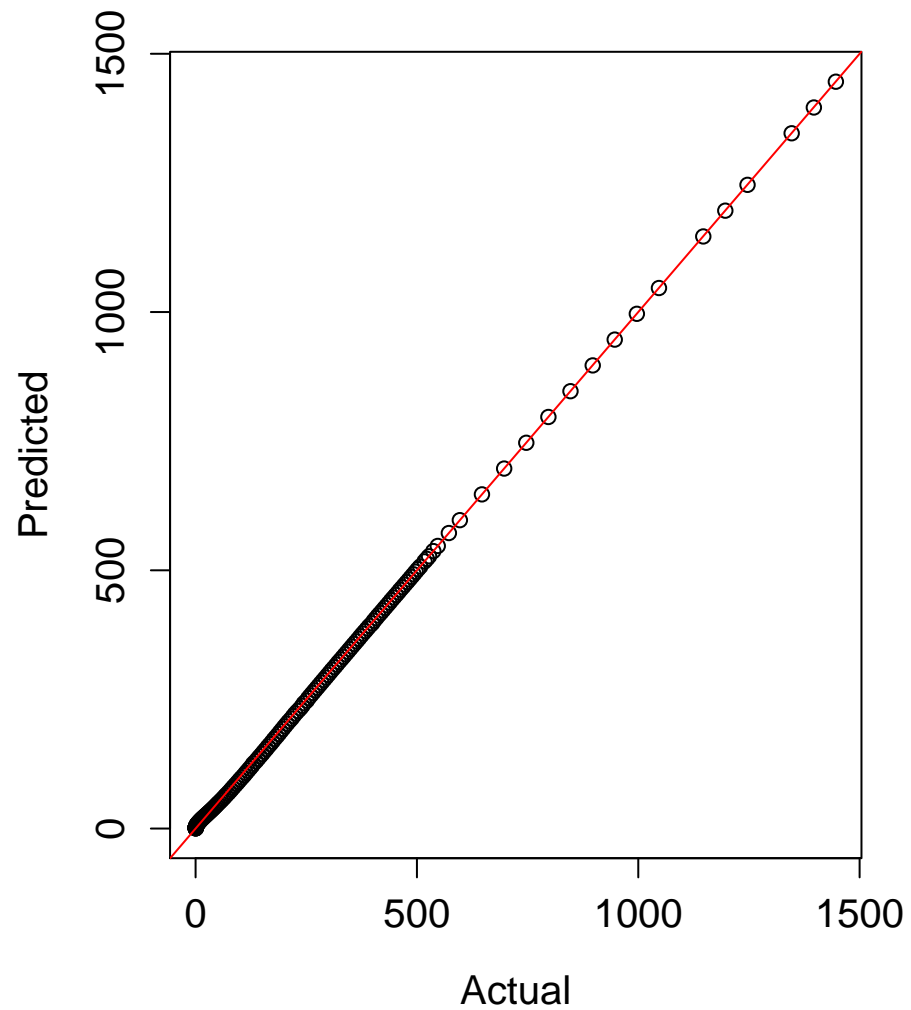
# MixLNorm



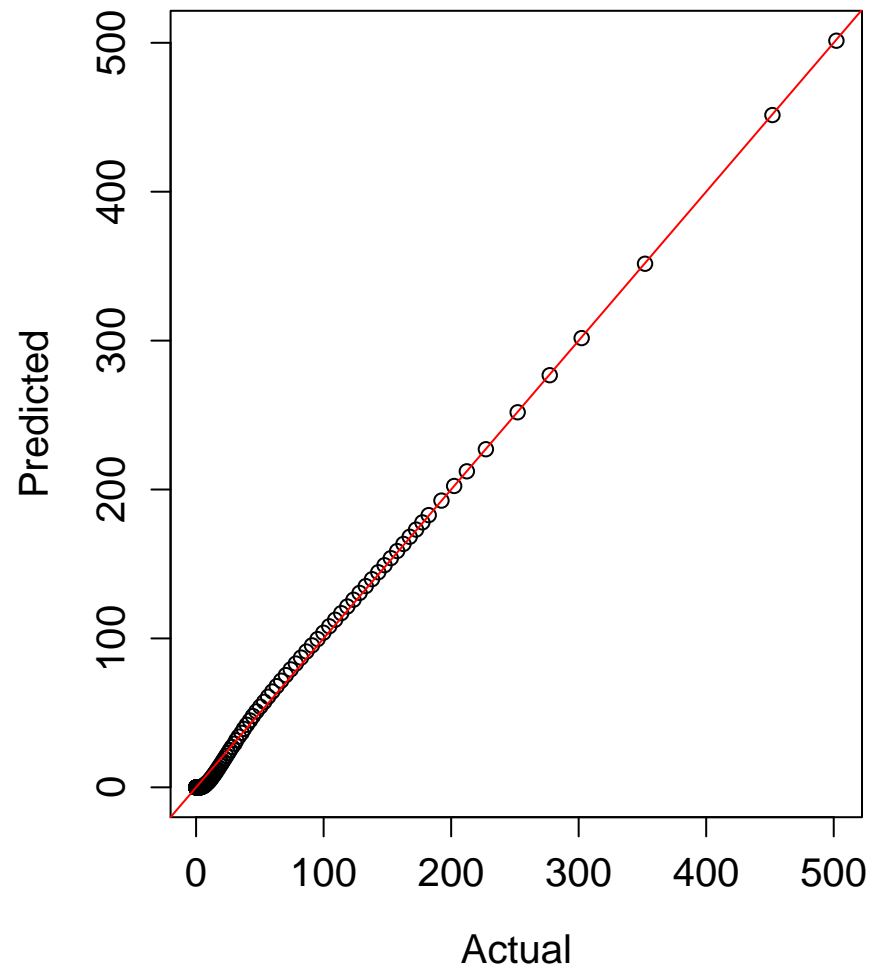
# Point Estimates



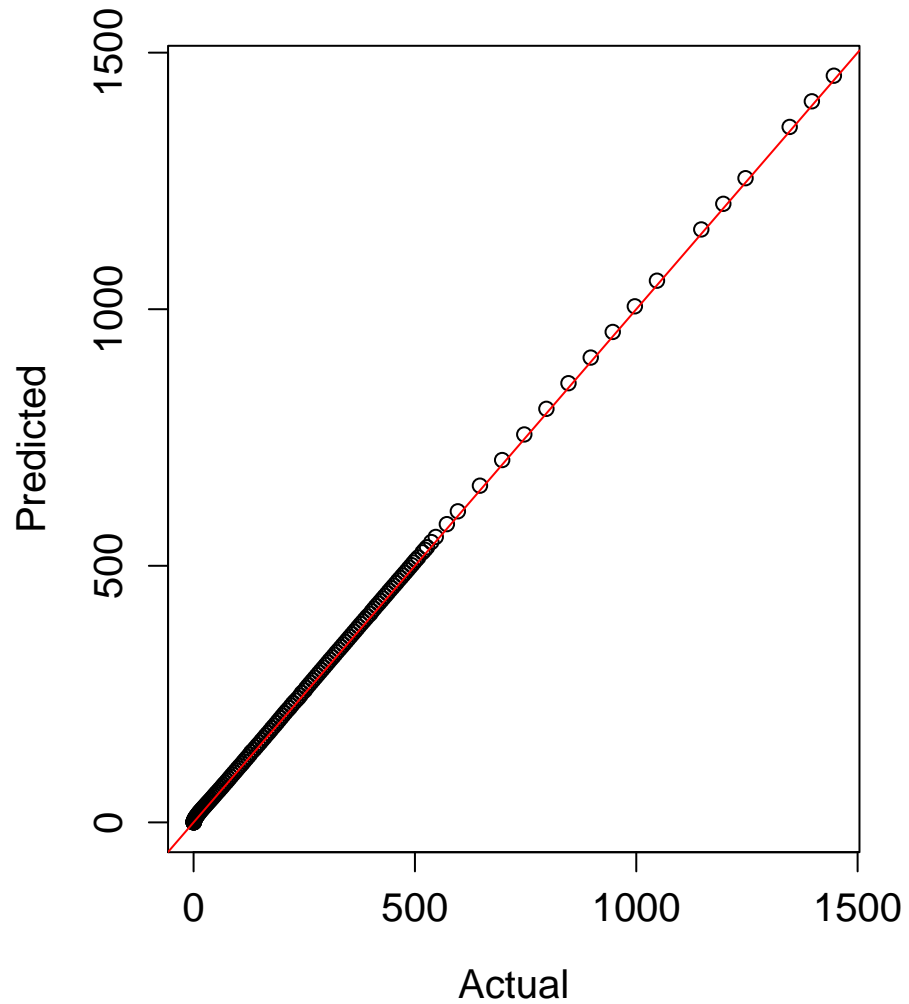
Single LNorm - Calls



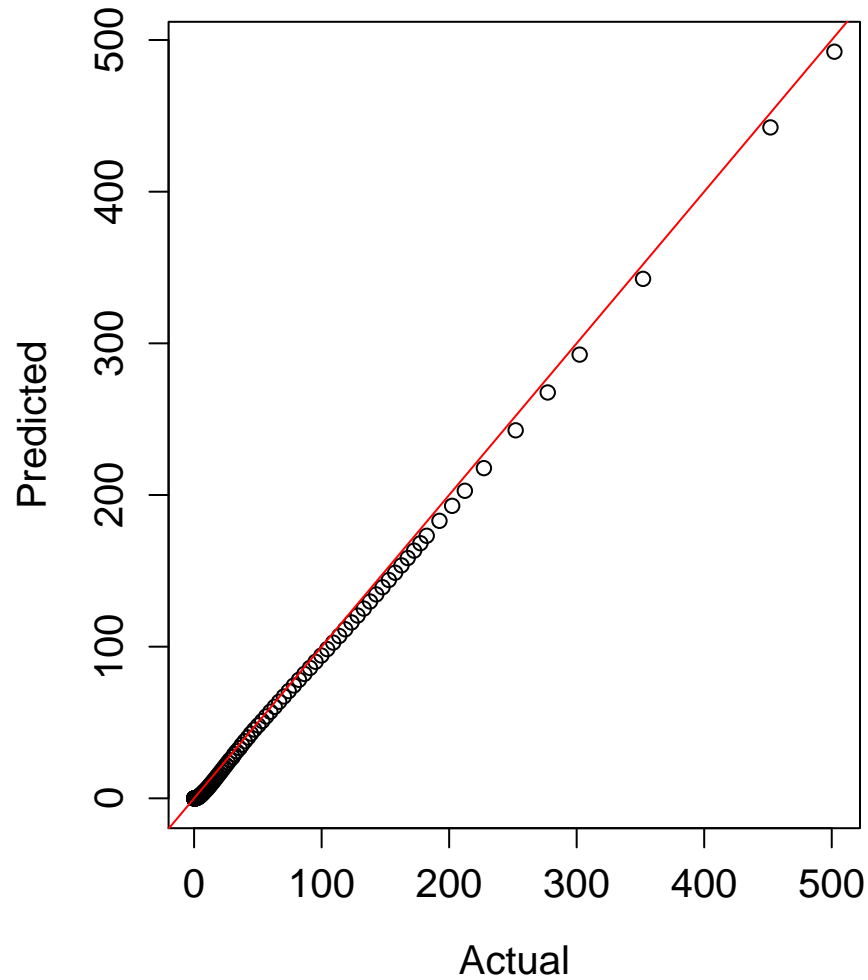
Single LNorm - Puts



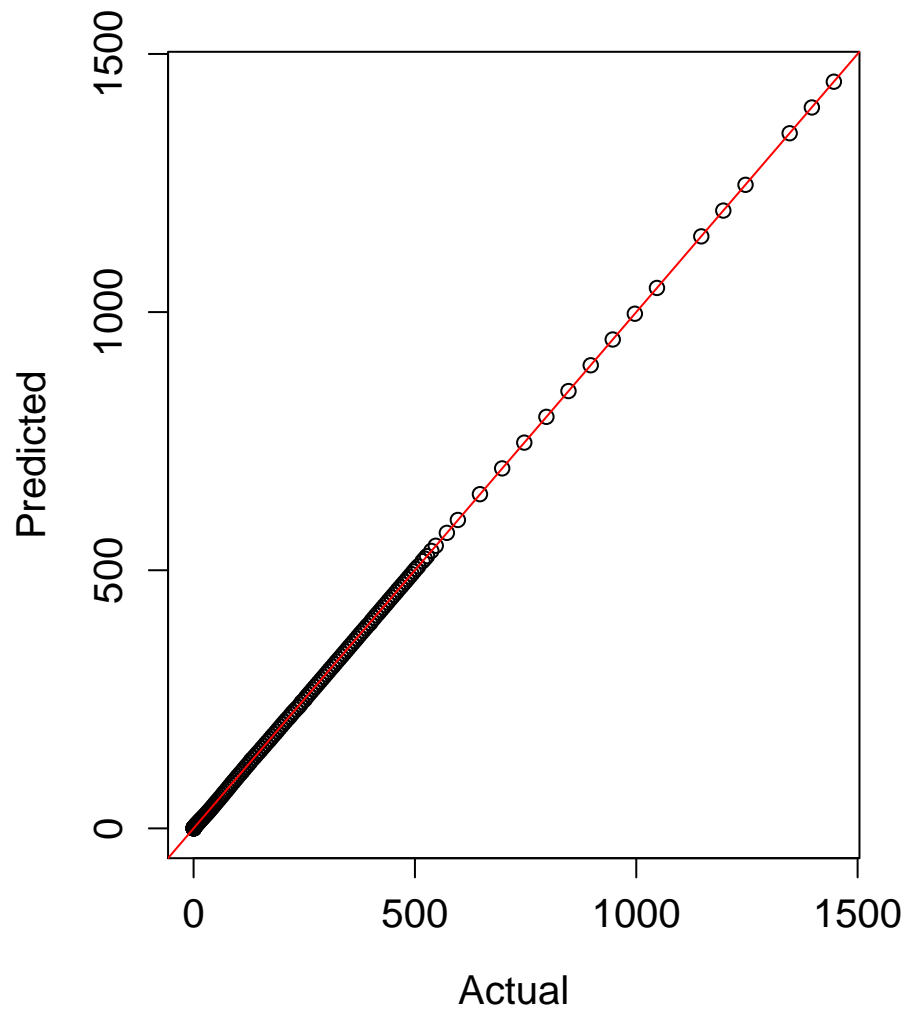
**GenBeta – Calls**



**GenBeta – Puts**



MixLNorm - Calls



MixLNorm - Puts

