Gaussian Mixture Models for Extreme Events

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In Finance we need log returns. A very common R idiom is:

$$Ylogrets = diff(log(Y)) \tag{1}$$

When we need the inverse, where $(r_1, ..., r_N) = Ylogrets$, we use:

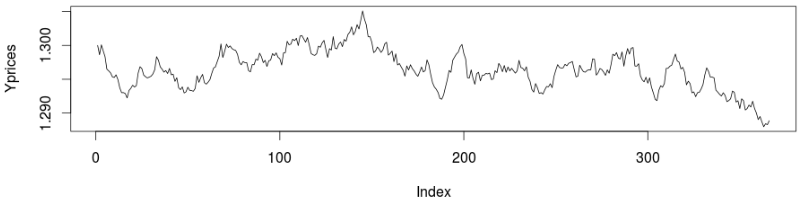
$$\left(Y_1, Y_1 \prod_{j=2}^{2} exp(r_j), ..., Y_1 \prod_{j=2}^{i} exp(r_j), ... Y_1 \prod_{j=2}^{N} exp(r_j) \right) \tag{2}$$

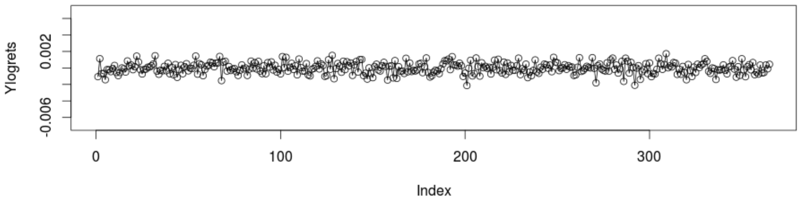
which simplfies to: $Y = (Y_1, ..., Y_N)$. All this is handled by the following R expression:

$$c(Y[1], Y[1] * exp(cumsum(Ylogrets))) \tag{3}$$

Basic Simulation from Gaussian Distribution

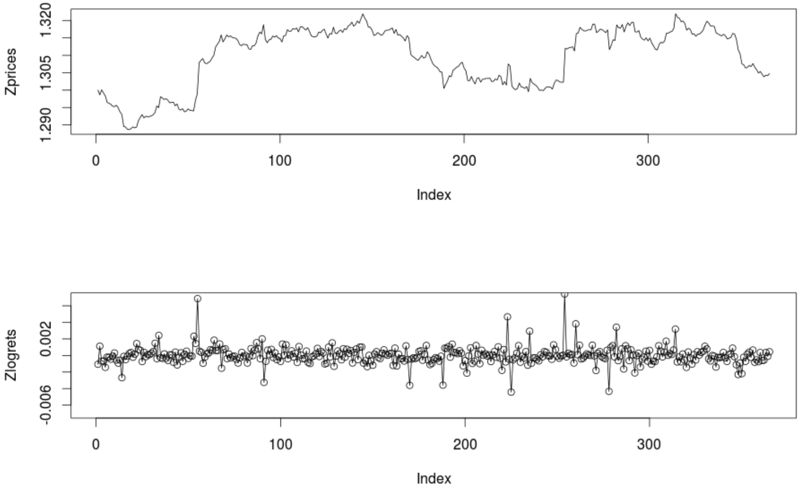
Generated Prices from Log Returns which stay within 3σ





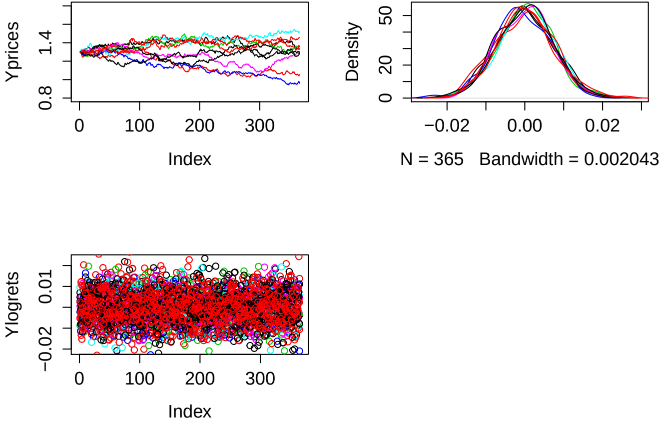
Customized Simulation from Gaussian Mixture Model

Generated Prices from Log Returns with Jumps



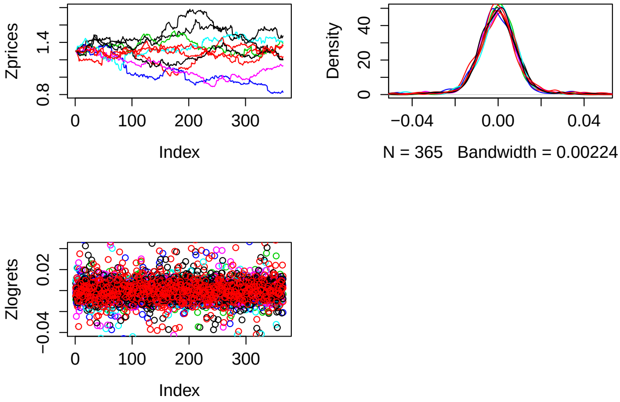
Simulation from Gaussian Model

Paths, Density Plot, Variates



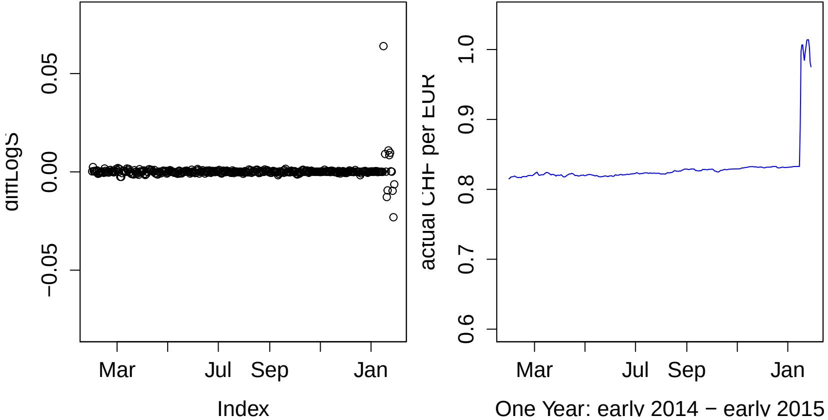
Simulation from Gaussian Mixture Model

Paths, Density Plot, Variates



January 15, 2015 CHF Goes from Pegged to Free!!!

That Event is a Jump or Sampled from Another Distribution



Simulating Extreme Events with Gaussian Mixture Model