

We present in this document some tests of the SABR Volga and the code used to produce them. It is interesting to note how generally Volga peaks on the wings and it drops at the ATM point as well as for very OTM strikes. This behavior can however change depending not only on the nu value but also on the rho and beta ones.

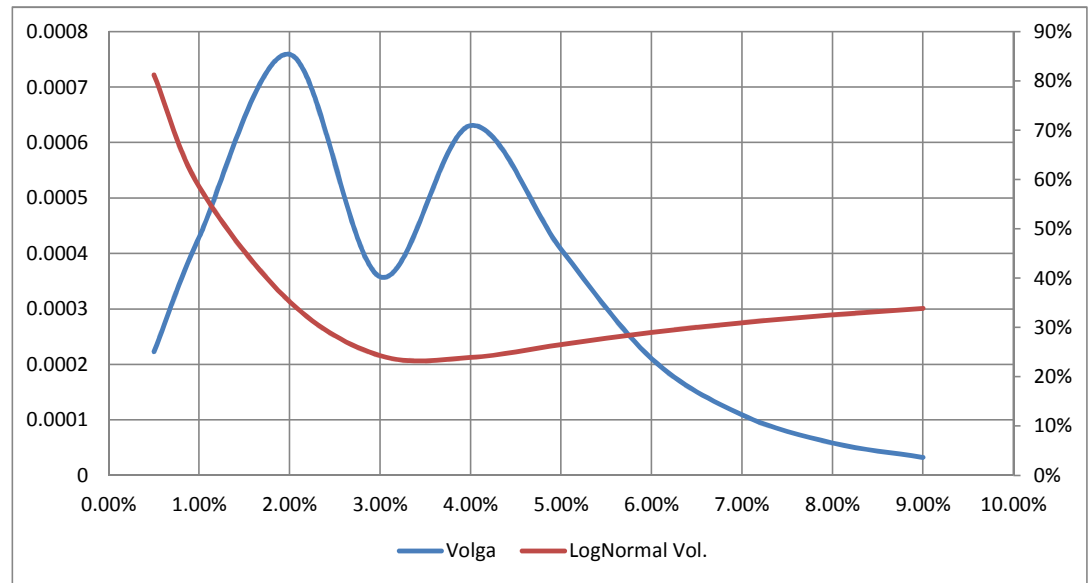
```
import math
```

```
def computeSABRVolga(y, expiry, F_0, alpha_0, beta, rho, nu, isCall):  
    small_figure = 1e-6  
    nu_plus_h = nu + small_figure  
    vol = haganLogNormalapprox(y, expiry, F_0, alpha_0, beta, nu_plus_h, rho)  
    px_nu_plus_h = black(F_0, y, expiry, vol, isCall)  
    nu_minus_h = nu - small_figure  
    vol = haganLogNormalapprox(y, expiry, F_0, alpha_0, beta, nu_minus_h, rho)  
    px_nu_minus_h = black(F_0, y, expiry, vol, isCall)  
    sabr_volga = computeFirstDerivative(px_nu_plus_h, px_nu_minus_h, small_figure)  
    return sabr_volga
```

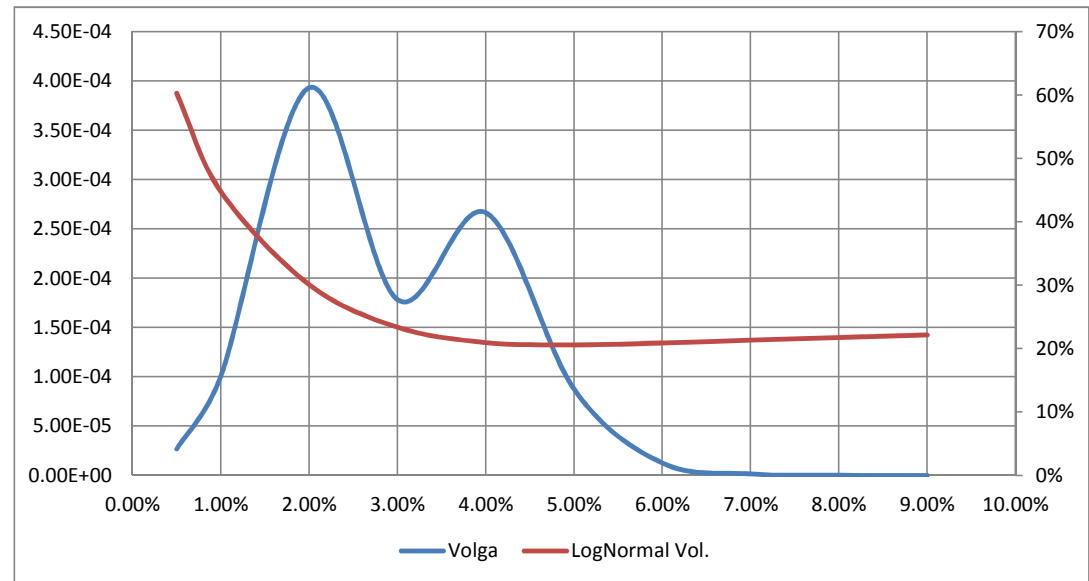
Strike	Volga	LogNormal Vol.
0.50%	0.00022306	81%
1%	4.30E-04	59%
2%	7.59E-04	35%
3%	3.58E-04	24%
4%	6.31E-04	24%
5%	4.08E-04	27%
6%	2.11E-04	29%
7%	1.09E-04	31%
8%	5.86E-05	33%
9%	3.25E-05	34%

ATM Forward % 3  
Maturity (Years) 1

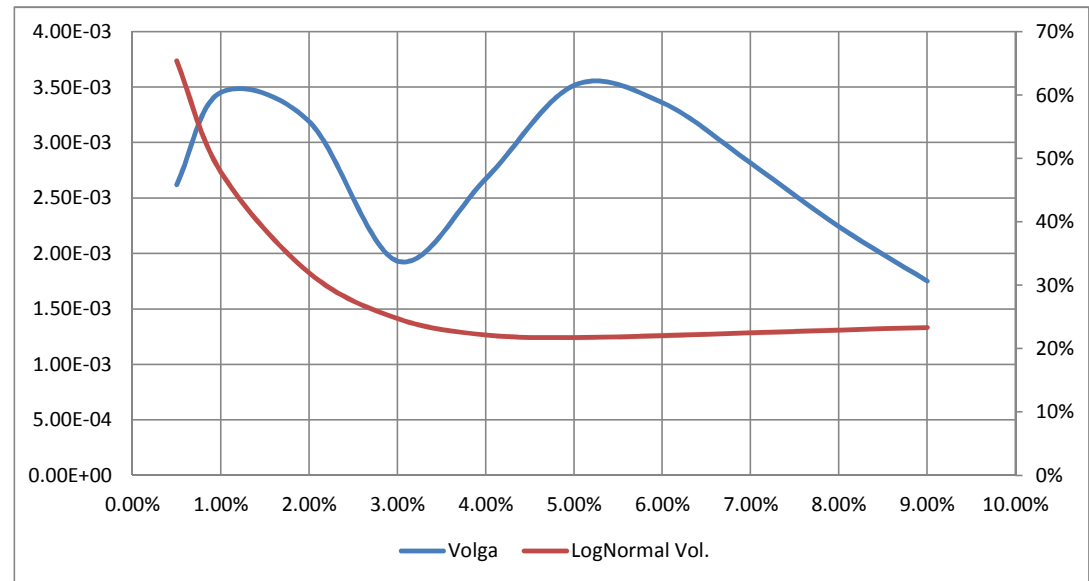
SABR Parameters  
Alpha 0.00982  
Rho -0.1  
Nu 0.8  
Beta 0.1



Strike	Volga	LogNormal Vol.
0.50%	2.68E-05	60%
1%	1.01E-04	45%
2%	3.93E-04	30%
3%	1.78E-04	23%
4%	2.66E-04	21%
5%	8.76E-05	21%
6%	1.26E-05	21%
7%	1.56E-06	21%
8%	1.97E-07	22%
9%	2.68E-08	22%
ATM Forward %		3
Maturity (Years)		1
SABR Parameters		
Alpha		0.00982
Rho		-0.1
Nu		0.4
Beta		0.1



Strike	Volga	LogNormal Vol.
0.50%	2.62E-03	65%
1%	3.45E-03	48%
2%	3.19E-03	32%
3%	1.93E-03	25%
4%	2.67E-03	22%
5%	3.52E-03	22%
6%	3.36E-03	22%
7%	2.82E-03	23%
8%	2.24E-03	23%
9%	1.75E-03	23%
ATM Forward %		3
Maturity (Years)		5
SABR Parameters		
Alpha		0.00982
Rho		-0.1
Nu		0.4
Beta		0.1



Strike	Volga	LogNormal Vol.
0.50%	4.78E-05	64%
1%	1.55E-04	47%
2%	5.17E-04	31%
3%	1.53E-04	23%
4%	1.08E-04	20%
5%	3.82E-05	19%
6%	3.49E-06	19%
7%	2.66E-07	19%
8%	2.18E-08	20%
9%	2.02E-09	20%

ATM Forward % 3  
Maturity (Years) 1

SABR Parameters  
Alpha 0.00982  
Rho -0.3  
Nu 0.4  
Beta 0.1

