FINM331/STAT339 Financial Data Analysis – Hanson – Winter 2009

Lecture 7 Homework: NonParametric Regression for Options and Time Series

(Homework Due by Lecture 8 in Chalk FINM331 Digital Dropbox or otherwise acceptable to TA/CA/Graders)

You must show your work, code and/or worksheet for full credit.

1. (20 points) Using Problem HW5.2 amd S&P 500 Data of HW2.4, compare the $\mathbf{VaR}(\boldsymbol{\alpha})$ for

(a) S& 500 Index Log-Returns;

(b) FD-Cauchy with matching data mode location and a fraction of mode height that fits the data tails;

(c) FD-Normal with data $(\boldsymbol{\mu}, \boldsymbol{\sigma}^2)$;

(d) Compare both absolute and relative errors with respect to the data $\mathbf{VaR}(\boldsymbol{\alpha})$ as the closest thing to a standard.

(e) Discuss results, in particular, the utility of the FD-Normal and the usual Normal in risk-assessment.;

2. For the Black-Scholes option pricing formula show that

$$\mathbf{vega} = \text{`}\boldsymbol{\nu}\text{`} = \frac{\partial C^{(\mathbf{bs})}}{\partial \boldsymbol{\sigma}} > \mathbf{0},$$

by direct differentiation or Mathematica/Maple. The postivity of this volatility sensitivity measure justifies the inversion of the BS call price function that can be used to compute the BS implied volatility for calibration to the market values.