Asset Pricing and Portfolio Management

EDHEC Business School – Apprenticeship Track

MSc Capital Markets

2022

Suppose that an investor owns, on September 25th, 2008 a portfolio worth $10 million consisting of investments in four stock indices: Dow Jones Industrial Average (DJIA) in the United States, the FTSE 100 in the United Kingdom, the CAC 40 in France, and the Nikkei 225 in Japan (use the *VaR.xlsx* excel file – see part 3 of the course). So, let's suppose that today is September 25th, 2008.

The value of the investment in each index on September 25, 2008, is (in $000s): $4000 in DJIA, $3000 in FTSE, $1000 in CAC and $2000 in NIKKEI.

You may use the "Part 2" and "Part 3" solutions Python programs (available on BB) for GARCH model estimations and VaR measurements.

Question 1: Using a GARCH model (1,1), estimate the tomorrow's volatility of each of the four indices. Compare the values obtained. Is the result in line with your expectations?

Question 2: Calculate tomorrow's portfolio volatility.

Question 3: Deduce an estimate of the daily VaR at the 99% confidence level of this portfolio (use the volatility estimate obtained with the GARCH(1,1) model in the previous question). Which assumptions did you have to use to obtain this estimate?

Question 4: Is this estimate significantly different from the one you would have obtained without using a GARCH model (1,1)?

Question 5: Using the same method, give an estimate of the daily VaR at 99.999%.

Question 6: Again using the results of the GARCH model (1,1), estimate a 10-day Var at the 99% confidence level. Is the result significantly different from that obtained without using a GARCH model?