**FIN567 Financial Risk Management Homework 8**

Group name: SSVJ

Group members:

HOU Sunjie shou10

GADDA Veeraj gadda2

HONG Sungwook hong85

YOON Joonha joonhay2

We used five years of historical data for the two assets so that we have a large enough data set to use GARCH model.

We first used GARCH(1, 1) to model the sigma. We used the maximum likelihood estimators as the initial values for NGARCH(1, 1) models. The parameters we obtained are:

Initial values for MSCI : 0.091822845, 0.738250207,0.01, 0.008315190, 0.009792746

Initial values for Russell : 0.089862460, 0.636519008,0.01, 0.009322215, 0.010851281

Then we used the maximum likelihood estimators of NGARCH(1, 1) models to calculate historical sigma values. Using the historical returns and historical sigma values, we calculated the standardized returns for the two assets. The parameters of NGARCH models are:

MSCI : 0.050867136, 0.867258688, -1.256457879, 0.014148679, 0.009151498

Russell: 0.06558024, 0.87202595, -0.97384324, 0.03596954, 0.01154721

Then we estimated a DCC(1, 1) model on historical dynamic correlations between the two assets using maximum likelihood method to gain the estimators. The estimators we obtained are:

Alpha = 0.01615509, Beta = 0.96517691

Using the same DCC(1, 1) models with the estimators we get, we then modeled the dynamic correlations in the next year. With those correlations, we are now able to simulate returns of the two assets for the next year, and hence calculate the fair value of this security.

We used 0.12% as the annual discount rate because it was the 1-yr treasury rate on August 4, 2014.

The value we get for this security is 1043.024.