Homework 2

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1.(a)

Value of the portfolio=-1001793

Delta=14.32774

Gamma=-22.83625

Theta=5992163

Vega=-4546567

(b)

Δ=14.33

Value=Delta*current value of S&P500 index=14.33*3295.47=47224.09

$\text{Var}[\Delta V] = 47224.09^2 * 0.013^2 = 376889.38$

Std[ΔV]= Var[ΔV]$^{1/2}$=613.91

VaR=-(0-1.645*613.91)=1009.89

(c)

Vega=-4546567

Value=Delta*current value of S&P500 index + vega*volatility

=14.33*3295.47+(-4546567)*0.22

Var[ΔV]=47224.09^2*0.013^2+1000244.74^2*0.04^2+2*47224.09*1000224.74*0.8*0.13*0.04=1.64*10^9

Std[ΔV]= Var[ΔV]$^{1/2}$=40502.6

VaR=-(0-1.645*640502.6)=66626.8

(d)Because in part (c) there are two factors to influence the value of the portfolio, so we need to consider the volatility.

2.

	date	msft	aapl	spy	xlf
1	20040102	0.002923	-0.004212	-0.000449	-0.001422
2	20040105	0.025137	0.041823	0.010878	0.008188
3	20040106	0.003554	-0.003608	0.000978	-0.000353
4	20040107	-0.001062	0.022635	0.003376	0.000706
5	200401(20040107	1772	0.034086	0.003985	0.003530
6	20040109	-0.017756	-0.015411	-0.008732	-0.003517
7	20040112	-0.003254	0.031739	0.007385	0.004236
8	20040113	-0.005078	0.016435	-0.005829	-0.004921

3.(a) For the whole sample:

	AAPL	MSFT	SPY	XLF
Mean	0.00148169	0.0005889	0.00036032	0.00027741
Standard deviation	0.02096741	0.01623896	0.01150999	0.01921378

5% quantiles	-0.0306839	-0.0232129	-0.0168447	-0.0253879

(b)For the data in 2018:

	AAPL	MSFT	SPY	XLF
Mean	-0.0026459	-0.0018589	-0.0014774	-0.0021405
Standard deviation	0.03666547	0.03054997	0.02601041	0.04499191
5% quantiles	-0.0581230	-0.0549476	-0.0448568	-0.0678234

4-7.

HS (red): Question 4

DN (blue): Question 5

DN_W (yellow): Question 6

HS_W (green): Question 7