

RMSC4002 2017/18 1st term Assignment 2

Q1.

This is a continuation of Q2 of assignment 1. In Q2 of assignment 1, you chose one stock to fit a EWMA model. Copy the Excel sheet containing the stock price, u , v and \sqrt{v} to a new sheet. Suppose we buy 500 shares of this stock on the last day (31/12/2016). We want to compute the 1-day 99.5% VaR using historical simulation and normal model. The following provides a template for this Excel sheet.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Stock	u	v	\sqrt{v}	Scenario	hsim1	loss1	hsim2	loss2					Loss	Back-test:	VaRn	VaRs1	VaRs2
2	$S(1)$																	
3	.	$u(1)$	$v(1)$	$s(1)$	1						$sd(u)=$							
4	.	.	.	.	2													
5	.	.	.	.	3						VaRn=							
6	.	.	.	.	.								
7																		
8											1-day 99.5%							
9											VaRs1=							
10																		
11		$u(n-1)$	$v(n-1)$	$s(n-1)$	$n-1$						1-day 99.5%							
12	$S(n+1)$	$u(n)$	$v(n)$	$s(n)$	n						VaRs2=							
13																		
14														L1		x	x	x
15														.		.	.	.
16														.		.	.	.
17														L130		x	x	x
18																		
19														no. of exception:		x	x	x

- Set up the historical simulation hsim1 in column F using the formula $\hat{v}(i) = v_n \times v_i / v_{i-1}$ and column H hsim2 using the formula at the bottom of page 4 in chapter 3, i.e. $\hat{v}(i) = v_n \times \frac{v_{i-1} + (v_i - v_{i-1}) \sigma_{n+1} / \sigma_i}{v_{i-1}}$, for $i=1, \dots, n$. Compute the loss for each scenario and sort the loss in column G and I respectively.
- Compute the 1-day 99.5% VaRs1 and VaRs2 using hsim1 and hsim2 in L9 and L12.
- Compute the sd. of u in L3 and compute the 1-day 99.5% VaR using normal model in L5.
- Perform the back-testing and find out the number of exceptions of the VaR in L5, L9 and L12 in columns P to R using the most current 250 days. What is your conclusion from these results?

Q2

The file “credit.csv” contains 7 columns and 690 records of credit application in a bank:

Column	Attribute Information:	name	value
1	Age:	Age	continuous.
2	Mean time at address:	Address	continuous.
3	Mean time with employers:	Employ	continuous.
4	Time with bank:	Bank	continuous.
5	Monthly housing expense:	House	continuous.
6	Savings account balance:	Save	continuous.
7	Result:	Result	binary

The first 6 columns are continuous while the last column is the result of the credit application (1=accept, 0=reject).

- Read in the dataset “credit.csv” and save it in d.

- (b) Using the last 5 digits of your student ID as random seed, partition d into training dataset d1 and testing dataset d2 as follow:
- ```
> set.seed(XXXXXX) # use the last 5 digits of your student id
> id<-sample(1:690,size=600) # generate random row index for d1
> d1<-d[id,] # training dataset
> d2<-d[-id,] # testing dataset
```
- (c) Using d1 and the glm() function in R, fit a logistic regression of Result on other variables. Exclude the insignificant variables step by step to arrive at a final model and save the output in lreg. Produce the classification table for this logistic regression on the training dataset d1.
- (d) Using the predict() function in R to produce the classification table on the testing dataset d2.
- (e) Compute and compare the misclassification rate for training and testing dataset.
- (f) Produce the lift chart for training dataset d1 as on p.11 of Chapter 5, using cumulative percentage of success vs. the proportion (1:n)/n. (i.e. the second graph on p.11).
- (g) Plot a similar lift chart for the testing dataset d2 on the same graph in (f). [Hint: use lines() instead of plot() will add the line on the same graph in (f).]
- (h) Compare and comment on these two lines in (f) and (g).

You need to submit three files via eLearning system: asg2-1.xls, asg2-2.r and asg2-2.doc. asg2-1.xls is the Excel file for Q1 and asg2-2.r is the R codes and asg2-2.doc is the output for Q2. The R codes should be **fully commented** as in my notes and ready to execute without bugs. You should also put a hard copy of your asg2-2.doc in Q2 in the drop-box.

The University places very high importance on honesty in academic work submitted by students, and adopts a policy of zero tolerance on cheating and plagiarism. See the following link for details: <http://www.cuhk.edu.hk/policy/academichonesty/>

**Submit your files on or before November 13, 2017**  
**and put a hard copy in the drop-box on or before November 14, 2017.**