UNIVERSIDAD DEL PACÍFICO
Academic Department of Finance
Quantitative Finance (1F0111)
Second Semester 2017
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Assessment 5

Instructions:

1. *Select one (and only one) of the following questions and answer it thoroughly.*
2. *To submit your answer you must commit a folder with your student ID to* `https://github.com/franciscorosales-marticorena/QuantFin/Sol`.
3. *The deadline to commit your work is 14.11.2017 at 11:30, i.e. you have 24 hours.*
4. *If you would like to add text to further explain your results, you can add a* `Read Me` *file.*
5. *Note that the information of your* `commit` *is public, this means we can all see your output.*
6. *Auxiliary material has been uploaded at* `https://github.com/franciscorosales-marticorena/QuantFin/Aux`.

1. **Cryptocurrencies** (20pts)

   In class we learned how to create the cryptocurrency CiupCoin. Now we ask you to customize some aspects of it to make it your own. Namely, you must change

   (a) the name of the currency from CiupCoin to a name of your choice, e.g. XCoin.

   (b) the reward from 10 to 13 XCoins.

   (c) the number of confirmations per block from 3 to 5.

   To verify that you were successful, take screenshots of your results after executing

   (a) `make -f makefile.unix &`

   (b) `./XCoin &`

   (c) `./XCoin sendtoaddress xyz 1`, where xyz is the public key corresponding to an account in your second virtual machine.

2. **Algorithmic Trading** (20pts)

   (a) Consider the MSFT time series from 1.11.2006 to 25.11.2016 and write an R script to replicate regression-based trading approach suggested in class. To show that you were successful compare:

      i. the partial results from running each function

      ii. the resulting confusion matrix

If the results are not identical, provide a detailed explanation and illustrate your arguments using computational examples/counter-examples.

(b) Solve the dynamic Markowitz portfolio problem:

$$\boldsymbol{\omega}_{\mathrm{Q}} = \mathrm{argmax}_{\boldsymbol{\omega}} \left\{ \hat{\boldsymbol{\mu}}^{\top} \boldsymbol{\omega} - \frac{\gamma}{2} \boldsymbol{\omega}^{\top} \hat{\boldsymbol{\Sigma}} \boldsymbol{\omega} : \mathbf{1}^{\top} \boldsymbol{\omega} = 1 \right\},$$

using the constant conditional correlation (CCC) model for risky assets:

- EEM: Ishares Msci Emerging Markets
- EFA: Ishares Msci Eafe Index Fund
- EWJ: iShares MSCI Japan Index Fund
- IEF: Ishares Lehman 7 10 Year Treasury Bond Fund
- IEV: iShares SAndP Europe 350 Index Fund
- IVV: iShares SAndP 500 Index Fund
- RWR: DJ Wilshire REIT ETF
- SHY: Ishares Lehman 1 3 Year Treasury Bond Fund
- TIP: Ishares Lehman Tips Bond Fund
- TLT: Ishares Lehman 20 Year Treasury Bond Fund
- VTI: Vanguard Total Stock Market ETF

Report a matrix of weights (11 rows) from 1.11.2007 to 25.11.2016 reporting your results

(c) Apply your results in (a) to each individual asset in (b). Provide ideas on how to use the information from the algorithmic trading methods to improve your Markowitz results.