

Solution Sheet on Problem Set 1

**Mean-variance analysis**

Deadline: 18/10/2018

***Solved by Lukas Schreiner***

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| **Task** | **Answer** | **Points Earned** |
| 1. **1)**  * mean daily return * mean weekly return * mean monthly return * mean annual return   Comment on whether the expected return increases or decreases with the horizon. | | **in %** | **Daily** | **Weekly** | **Monthly** | **Yearly** | | --- | --- | --- | --- | --- | | **Mean** | 0.029713 | 0.143241 | 0.621640 | 7.327088 | | **Std** | 0.964509 | 2.271903 | 4.166587 | 15.716742 | | **Variance** | 0.009303 | 0.051615 | 0.173604 | 2.470160 |   **The expected return rises with the time horizon. This is not surprising.** |  |
| 1. **2)**  * mean daily * mean weekly * mean monthly * annual   variance & standard deviation values  Comment on whether the variance of returns increases or decreases with time horizon.  Compare the scale of the horizon for the variance and standard deviation with the one of the returns, from question (1a). | **See table in 1.1.**  **The variance and standard deviation of returns increases as well with the time horizon. The risk increases as we have longer exposure to the market.** |  |
| **1. 3)** Report the value of the investment at the end of 2017. | Value of 1 USD Investment today: 161.32 USD |  |
| **1. 4)** Report the cumulative excess return for the period of January 3. 2000 to December 29, 2017. | The excess return over the period is 8.9233 percent |  |
| **1. 5)**   * daily * weekly * monthly Sharpe ratios   Comment 1  Comment 2 | | **.** | **Daily** | **Weekly** | **Monthly** | **Yearly** | | --- | --- | --- | --- | --- | | **Sharpe Ratio** | 0.607171 | 0.937168 | 1.242186 | 0.921079 |   **Comment 1**  **It seems that the Sharpe ratio increases with a bigger time horizon.**  **Comment 2**  **You could say that on average the long-term equity markets offer a better risk/ return profile. However, this does not take the investor’s risk profile into account.** |  |
| 1. **6)** Insert your explanation here |  |  |
| 1. **1)** Insert your plots here   Comments: |  |  |
| 1. **2)** Weights of the RF asset for the 1st, 10th, 30nd , and 39th portfolios. Do we borrow or lend more when we require a higher return? |  |  |
| **2. 3)** Plot the MVF for the 30 portfolios (6-stock case).  Comment |  |  |
| **2. 4)** Plot the MVF for the 30 portfolios (including all 48 stocks). What happens to the MVF as we add assets to it? |  |  |
| **2. 5)** Report the weights of Credit Suisse and Novartis in the tangency portfolio (including all 48 stocks). Plot of the MVF together with tangency portfolio |  |  |
| **2. 6)** Why is the tangency portfolio far from the MVF, which you built in 2.5? Which input and how would you change so that your tangency portfolio is on the MV frontier?  Insert the resulting figure. |  |  |
| **2. 7)** Report the weights of UBS, ABB, and Roche in the minimum-variance portfolio (including all 48 stocks). |  |  |
| 2. 8) Why are the weights so different in both the MVP and the tangency portfolio for SPSN and CLN? |  |  |
| 2. 9) Report the weights and comment on why we assign the corresponding weights to CSGN versus TEM given that it contradicts their risk-return trade-off? |  |  |
| 2. 10) Why is the variance of the MVP equal to the covariance of the MVP with the tangency portfolio? |  |  |