Opponent Report

Title: Risk and ratio measures in portfolio optimization

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Mr. Juraj Zelman wrote a thesis entitled "Risk and ratio measures in portfolio optimization". The author analyzes several risk measures from a theoretical viewpoint and discussing the implementation of an optimization model with discrete distributions of the random variables. The theoretical analysis is quite extensive and very precise. The discussion of the distortion risk measure is very interesting and the author explains the relation with classical risk measures and the generalization allowed by such innovation. I believe that the quality of this thesis is excellent and the empirical results could be the foundation of further analysis and investigation.

I do think that this thesis fulfill the standards for a Bachelor Thesis at Charles University.

Here, I list some minor comments and doubts:

1. Page 26. The equality in the middle of the page shows a very nice simplification for discrete distributions. Such simplification can be done only for discrete distribution or is it possible to simplify also Definition 6?
2. Page 27. There is something in the notation that is not clear to me. In model (3.2), why some constraints are defined with Y and some with y? They should represent the same vector or not? Maybe I would give a number to each constraint to help the reader to follow the logic from the definition of the decision variable to the definition of the objective function. Something like: Given the portfolio decision w, constraint 3 compute the portfolio losses, then constraint 4 reorder this vector of losses thanks to the permutation matrix P whose elements are restricted with constraints 5,6,7, finally, constraints 1 and 2 computes the reward and risk of the ordered vector of losses and in the objective function we minimize R which represents…
3. Page 28. It is not clear why you need to define gross returns (and gross losses) and you don't just remove constraint 2 from 3.2. Then, in constraint 1 of 3.3, is it correct $\mu(\tilde{Y}_{\_})$ or it should be $\mu(-\tilde{Y})$ as it was in 3.2? Or it is a notation to consider just the values less then 1 of $\tilde{Y}$? This is not clear.
4. Page 29. Since the Table 4.1 is not so huge, maybe you could add the name of the asset in each row to make easier the understanding of the performance of each asset and to better follow the next part. Then the description of the ticker and of the sector is ok in Table A.1
5. Page 30. The relation between the data in Table 4.1 and the dot positions in Figure 4.1 is not clear. For instance, asset A7 (Amazon) have mean 0,28 and STD 2,77 but in the Figure its coordinates are around 0,035 and -0,002. Could you please clarify? Maybe to have these data/representation homogeneous could help the understanding.
6. Page 30. How much it is the risk-free rate? Because the Max Sharpe Ratio portfolio should be the one on the frontier with tangent with maximum slope, but it doesn't look like.
7. Page 33. Comparing Table 4.2 and 4.3 is not an easy job because the definitions of Risk and of SR/RRR change. Therefore, it is not clear if actually the new portfolios are better or not of the Markowitz/Sharpe ones. Maybe you could also generate a unique figure with all the efficient frontiers.

14.6.2021 Dr. Sebastiano Vitali, Ph.D.