Presentation 8, Homework, Model solution

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Task 1:

The given problem must have multiple stakeholders and the stakeholders must have conflicting objectives or different perspectives.

Example problem:

Some mining company is planning to open new mines. The first stakeholder could be the mining company and its stakeholders that are mainly interested in profits of the mines, and they are not that interested in for example on the environmental issues and risks. Second stakeholder could be some environmental organization that is against all damage to environment and does not want the mines to be located in such places that can cause harm to the environment near the mine. Third stakeholder could be the communities near the mines that are somewhere between the first and second stakeholder. They see the environment important but also see the benefits in the jobs that a new mine would bring to the area.

For the weights there is not one method that would be the correct. So, the answer should have some discussion on how this could be approached or even why it is not possible to assign the weights so that all the stakeholders are satisfied.

One way would be to use similar approach as in the first application. This means that one would use the robust portfolio modelling methodology with some partial information. For example, in the mining example the government or ELY-keskus could say that the mining company is more important than the environmental organization and we would only focus on the set of weights for which this is true. Using RPM, we could identify the nondominated projects and focus on those. This of course does not guarantee that all the stakeholders are satisfied.

Also, using the method of minimizing the maximum regret can generate solutions that are acceptable to all stakeholders. In some cases, considering some transfer payments to compensate some stakeholders could also work. But in the end, it is likely that some of the stakeholders are not satisfied.

Task 2:

The advantages and limitations of the methods used in application 2.

The advantages and limitations are discussed in the chapter *5. Discussion*. Answer should include some of the following:

Advantages:

- The robust portfolio selection model used provided a transparent picture of how investment strategies and decision parameter uncertainty affect both the performance and composition of investment portfolios
    - Can be implemented in spreadsheet and done in-house
    - The simplicity and transparency of the techniques is important in building trust in the modelling process and increasing stakeholder acceptance
    - Not forcing DM's to arrive at a single complete parameter specification when they know these values are inherently uncertain may also help to build confidence and trust in the model
- Analysing only 36 portfolios enabled a clearer understanding of the technical details by decision-makers and more effective communication of the results

- (Preference programming provides a practical way of evaluating investments)
- (Calculation of a core index based on the concepts of dominance provides a simple and transparent metric for evaluating more robust investment alternatives)

Limitations:

- The treatment of uncertainty distributions was simplistic
    - Equal probabilities were assumed for portfolios selected at the extrema (i.e. optimistic and pessimistic decision rules, low and high budget estimates) as for those selected using the most likely estimates
    - Uncertainty in costs, benefits, and budgets is continuous and better characterised as probability distributions
- Using just three decision rules restricts the assessment to these points and does not cater for the continuous scale of preferences decision-makers typically have
- Covariance in costs and/or benefits of investments was not considered
    - It is likely that variation in costs and/or benefits between individual investments is correlated which increases the risk of under-performance

- (The cost-effectiveness of individual targets varied substantially, which makes the systematic consideration of costs and benefits extremely complex)